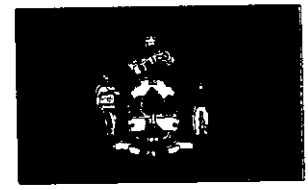


Maine

U.S. Department
of Transportation

Federal Highway Administration

LTPP Specific Pavement Studies

Construction Report on
SHRP 230500, SPS-5 Project,
Argyle, ME, Summer of 1995

Report No. FHWA-TS-95-23-02

December 1995

Notice

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

The contents of this report reflect the views of the contractor who is responsible for the accuracy of the data presented herein. The contents do not necessarily reflect the official policy of the Department of Transportation.

This report does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade or manufacturer's names appear herein only because they are considered essential to the object of this document.

LTPP Specific Pavement Studies

Construction Report on SHRP 230500, SPS-5 Project Argyle, ME, Summer of 1995

Report No. FHWA-TS-95-23-02

Prepared by

Pavement Management Systems Limited
415 Lawrence Bell Drive - Suite 3
Amherst, New York 14221

Prepared for

Federal Highway Administration
LTPP-Division, HNR-40
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike
McLean, Virginia 22101

December 1995

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA-TS-95-23-02		

4. Title and Subtitle	5. Report Date
LTPP Specific Pavement Studies Construction Report, SHRP 230500, SPS-5 Project, Argyle, ME, Summer 1995	December 1995
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Basel Abukhater	
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Pavement Management Systems Limited 415 Lawrence Bell Drive - Suite 3 Amherst, New York 14221	11. Contract or Grant No. DTFH61-92-C-00007
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Federal Highway Administration LTPP-Division, HNR-40 Turner-Fairbanks Highway Research Center 6300 Georgetown Pike McLean, Virginia 22101	14. Sponsoring Agency Code

15. Supplementary Notes

The report is a cooperative effort between Maine Department of Transportation (MDOT) Technical Services Division and Pavement Management Systems Limited LTPP North Atlantic Region Coordination Office.

PROFILOMETER is a trademark of K. J. Law Engineers, Inc.

DIPSTICK is a trademark of Face Technologies, Inc.

16. Abstract

This report provides a description of the construction of an SPS-5 experiment, rehabilitation of asphalt concrete pavements, conducted as part of the Long Term Pavement Performance (LTPP) program at Argyle, Maine. The construction of ten asphalt concrete surface pavement test sections started on June 17, 1995 and was completed on June 27, 1995. The construction started with milling four of the test sections followed by paving using a Dense Virgin Shim "D" Mix Asphalt Concrete Base layer or a Dense Virgin "B" Mix or Recycled "B" Mix 30% RAP Asphalt Concrete Binder layer then laying and a Dense Virgin "C" Mix or Recycled "C" Mix 30% RAP Asphalt Concrete Surface layer. The report contains a description of the milling operation, the paving operations, the equipment used by the contractor, the field sampling and testing operations before, during, and after construction, problems encountered during construction, specific site circumstances, deviations from the standard guidelines, and a summary of the initial data collection.

17. Key Words	18. Distribution Statement
Monitoring, Survey, Falling Weight Deflectometer (FWD), Profilometer, Dipstick.	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price

Form DOT F 1700.7 (8-72) Facsimile

Table of Contents

List of Tables

List of Figures

List of Photos

Construction Report on SHRP 230500, SPS-5 Project, Argyle, ME, Summer of 1995

I. Introduction

The Maine Department of Transportation (MDOT) SPS-5 project at Argyle, ME, is a study of the effects of rehabilitation treatments on the performance of asphalt concrete pavements. The treatments include minimal and intensive surface preparation with different AC overlay thickness and type (virgin or recycled material). The project lies in the wet-freeze environmental area with an existing 216 mm to 241 mm asphalt concrete pavement over 102 mm of gravel aggregate base course and a high fill of uncrushed gravel subbase layer. In addition to the eight SHRP test sections of the main experiment, designated sections 2 through 9, there is a control section which receives no overlay, designated section 1, and an MDOT (agency design) supplemental section 230559. Table 1 lists all the sections of this experiment, the station, length, overlay thickness and type.

The project is built on the North Bound lanes of I-95, Argyle, approximately 30 kilometers north of Bangor and 30 kilometers south of the town of Howland. The ten test sections are constructed adjacent to each other in series starting at the construction chainage of 1215+00 and ending at 1287+80 (construction stationing is in feet). The SHRP station 0+00 of the first section 230501 being at construction station 1215+00, and the SHRP station 5+00 of the last section 230559 being at construction station 1287+80, Figure 1. Each section is 152.4 meters long and 3.7 meters wide. The shoulders are paved with the outside being 3.0 m wide and the inside being 1.2 m wide.

The project was built as part of the State of Maine, Department of Transportation, Federal Aid Project No. IR-IM-95-8(152), "Building an Overlay and Guardrail Modification" located in Penobscot County on I-95 Northbound beginning at approximately the Alton-Old Town townline and extending Northerly 27.4 kilometers to approximately the Rte. 155 interchange in Howland. The project was advertised for bids on October 26, 1994 using MDOT standard contract administration and construction procedures. The contract was awarded to The Lane Construction Corp. of Meriden, Conn. on November 23, 1994 for the value of US$ 1,816,731.15. Working days assigned for this contract were 100 days with April 19, 1995 being the starting date and October 15, 1995 being the finishing date.

A pre construction meeting was held at the Lane Construction Corp. premises in Bangor ME on March 29, 1995 at 0900 hours. Mr. Dick Norton, MDOT Technical Services Division, and Mr. Basel Abukhater of Pavement Management Systems Limited (PMSL) North Atlantic Regional Office (NARO) attended the meeting that was arranged by Mr. Jerry Waldo, Area Highway Construction Engineer. Also present at this meeting were MDOT supervision staff including Mr. Dale Mayo the Resident Engineer, and the contractor's and subcontractors' staff including Mr. Ken Anderson of Lane Construction, project superintendent. Mr. Jerry Waldo talked about the different details of the project including the SPS-5 experimental sections. Mr. Ken Anderson explained that the project

will be split into five parts, part 1 being at the South end of the project and part 5 being at the North end. The SPS-5 sections are included in part 2 and the GPS section 231001 is in part 5. The contractor will be working in parts 1,3, and 5 first and when done will move to parts 2 and 4. Thus the work on the GPS section would be starting in early May and on the SPS section in the latter part of May 1995. Mr. Basel Abukhater talked about the required field material sampling and testing during the construction operations and the Rod and Level survey on each of the GPS and SPS sections prior to any milling and overlay and after each milling and layer placement, a total of 55 points per section per layer or activity.

The Prepaving Conference for this project was held in two parts due to the experimental area and the approval of mix designs. Prior to the Prepaving meetings, a meeting was held at the SPS site on May 4, 1995 at 0830 hours to clarify the intended work at the SPS experimental site. The first Prepaving meeting was held on May 12, 1995 and the details of the mix designs, equipment to be used, and construction stages were discussed. The second Prepaving meeting was held at the Resident Engineer's office on May 24, 1995 at 0900 hours. The purpose of this meeting was to fine tune the paving operation and to coordinate the testing required by SHRP. Final dates of the construction stages were submitted by the contractor in this last meeting. Mr. John (Wilbur) Dunphy of the Technical Services Division and Mr. Basel Abukhater of PMSL-NARO attended the first meeting on May 4 and the last Prepaving meeting on May 24.

A meeting was held at the laboratory facility in Bangor ME on the afternoon of May 24, 1995 to discuss the quantities to be sampled and the MDOT laboratory testing requirements as per the SHRP laboratory protocols. MDOT lab personnel, Mr. James Osgood MDOT FQC, Mr. Wilbur Dunphy, MDOT Technical Services Division, and Mr. Basel Abukhater, PMSL-NARO attended the meeting. Appendix A includes all correspondence related to the different stages of the pre construction sampling and testing, the construction operations details including sampling and testing, and the post construction activities.

On site and in charge of the construction work was Mr. Dale Mayo, MDOT Resident Engineer, Mr. Joseph Stewart, MDOT Inspector, asphalt and paving, and Mr. Jon Bither, MDOT Inspector, Milling Operations. Mr. Ed Higgins, MDOT Inspector, was keeping track of all hauling trucks and the laydown temperatures. Mr. Wilbur Dunphy was watching all the pre, during, and post construction operations and took care of completing all the inventory, Maintenance, Rehabilitation, and Construction Data Sheets. Mr. Dick Winslow, MDOT Engineering Technician Division 3 Office in Bangor ME, was responsible for all the Field Material Sampling on site during the paving operations. Mr. Rick Bradbury, MDOT Quality Control Technician, was responsible for the operations at the asphalt plant including the bulk sampling of the asphalt cement and the uncoated aggregate and recycled material for the MDOT laboratory testing and the Materials Reference Library (MRL) samples. Laboratory testing of the subgrade, subbase, base, existing old asphalt collected before construction and the new asphalt concrete overlay loose mixes and cores collected during and after construction will be done by MDOT lab at the Division 3 Office in Bangor ME (SHRP Laboratory Assigned Code 2321) and the FHWA Contractor Laboratory, Law Engineering in Atlanta GA (SHRP Laboratory Assigned Code 1311).

The Lane Construction Corp. used asphalt from its drum mix asphalt plant in Alton, ME. The hauling distance between the SPS-5 site and the plant is 13 km and takes between 15 and 20 minutes travel time. This four bin cold feed Portable Model 500 Recycle Drum Mix Asphalt Plant is manufactured by Bituma. The Control Room is furnished by "Ramsey Instrumentation and Automation for the Process Industries". The aggregate used was brought from the plant pit location and the AC cement used was AC10 from Irving Oil Limited, St. John Refinery in New Brunswick Canada. The recycled material used was brought from two projects, first the Old Town South Bound Project and the second is I-95 North Bound Project. The Recycled Material used in the SHRP travel lane and the outside shoulder was 30% RAP, while in the passing lane and the inside shoulder, 20% RAP was used in all the binder layers and in the surface paving of the lanes adjacent to sections 230503, 230504, 230507, and 230508. All the rest matched the SPS-5 sections. A detailed sketch of the plant drum mixer is included in Appendix A. All mix designs used in this project, including non SHRP lanes, are also included in Appendix A. Photos of the asphalt plant taken on June 21, 1995 are included in Appendix B.

The paving equipment used in the construction included a BLAW-KNOX model PF-180H paver, a BOMAG Steel Double Drum Vibratory Breakdown Roller model type BW 201 AD, operating weight 10077 kg and maximum weight 11193 kg, a BOMAG Rubber Tire Pneumatic Roller model type BW 20R, operating weight 12238 kg and maximum weight 24598 kg, and a Hyster Steel Double Drum Final Roller model type C 350D. For the milling operation, a ROTO-MILL Pavement Profiler model type PR-500-FL manufactured by CMI Corporation, Oklahoma City.

II. Project Details

Layout

The eight main SHRP SPS sections, the control section, and the MDOT supplemental section are laid in series starting with the SHRP control section 230501 station 0+00 at construction station 1215+00 followed by the four SHRP minimal surface preparation sections and the four intensive surface preparation (milling 38 mm) sections and ending with the MDOT supplemental section 230559 whose station 5+00 is at construction station 1287+80. The four minimal preparation sections consist of two recycled mix, 230502 with thin 51 mm and 230503 with thick 127 mm overlay, and two virgin mix, 230504 with thick 127 mm and 230505 with thin 51 mm overlay. The four intensive preparation sections consist also of two virgin mix, 230506 with thin 51 mm and 230507 with thick 127 mm overlay, and two recycled mix, 230508 with thick 127 mm and 230509 with thin 51 mm overlay. Table 1 lists the construction stations, experimental stations, length, overlay thickness and type, and the surface preparation performed on each section.

Field Materials Sampling and Testing

Locations for field material sampling and testing are summarized in Figure 2. Three main stages of field material sampling and testing were involved here; first, on the existing old surface before construction, second during construction, and third on the final new surface asphalt concrete layer after construction. Table 2 summarizes the field testing on every layer, before and after construction, the number of tests, and the location designation. Table 3 summarizes the material sampling performed on each layer, before, during, and

after construction, the number of samples collected, and the sample location of each. Table 4 is intended to show the number, quantity, and location of the bulk samples collected during construction, and to identify those to be used for testing as part of the SPS-5 experiment, and those to be sent to the Materials Reference Library. MDOT performed all the field testing, material sampling, and agency laboratory testing required by the FHWA for the SPS-5 experiment. Table 5 shows the dates of all the field testing and sampling activities throughout the pre, during, and post construction periods. Table 6 lists the actual date as compared to the guidelines of the monitoring performed before construction as well as the initial monitoring measurements collected after construction of the SPS-5 sites.

The laboratory material testing plan for each of the layers, before, during, and after construction, is summarized in Table 7. The SHRP test designation and Protocol number for each test is tabulated and so are the number of tests per layer and material source or test or sample location. In addition to the MDOT Laboratory in Bangor ME (SHRP Laboratory Assigned Code 2321), some of the testing, especially the Resilient Modulus, Tensile Strength, and Creep Compliance will be performed by the FHWA-LTPP Contractor Laboratory, Law Engineering, Inc. in Atlanta, Georgia (SHRP Laboratory Assigned Code 1311).

III. Pre Construction Operations and Performance

Pre construction testing and sampling was done on June 6, 7, and 8, 1994. Table 2 lists all the field testing, number and location, performed on site before construction and Table 3 lists the material sampling of the different layers of the existing surface and subsurface layers, number and location, collected from the site. Table 7 lists the laboratory testing to be performed on the collected samples by the MDOT laboratory and the FHWA contractor lab. During this period the site was not yet marked and a mistake was made in locating the 5+00 station of section 230506. Thus the samples that were supposed to be collected in sampling area 12 of section 230506 at stations 5+25, 5+30, 5+35, and 5+40 were actually taken at stations 5+05, 5+10, 5+15, and 5+20 respectively.

The site was initially marked, according to the guidelines, during the first week of April 1995. Figure 5 shows the paint marks used on the sections to identify the location of the beginning of each of the sections and at 30.5 m intervals. The same marks were put on the pavement after placing the overlays.

Profilometer testing was initially performed on April 20 and 21, 1995. The average International Roughness Index (IRI) values from five runs for each of the ten sections, before and after construction, are presented in Table 14. Plots of the elevation measurements, in the left wheel path and the right wheel path, from all the sites, before and after construction, are presented in Figures 6 to 15. The site was also videoed on April 20, 1995.

The Falling Weight Deflectometer (FWD) and Manual Distress Survey (MDS), including transverse Dipstick measurements, on the existing surface layer of the sections were performed on April 24, 25, and 26, 1995. The FWD was also used on June 6, 1994 to measure the deflections at the two test pit locations. The MDS indicated that there were two major high severity longitudinal cracks running throughout the entire length of the

project, the first at the edge of pavement and the second at the centerline. Also there were a few high severity transverse cracks in some of the sections. A Few more medium and low severity longitudinal and transverse cracks were also recorded at various locations throughout the project. The other two major distresses encountered were rutting in the wheel paths and bleeding, which was also mainly in the wheel paths. Photos in Appendix B show some of the distresses. The rut depth values in the left and right wheel paths, as determined from the Dipstick, before and after construction, are summarized in Table 15 and plotted in Figures 16 to 25.

IV. Construction

Table 8 lists all the dates of the construction activities for all the sections. The milling operation of sections 230506, 230507, 230508, and 360809 was performed on June 17, 1995. Paving of the sections started on June 20, 1995 with the Binder AC Dense Graded "B" Mix Virgin and Recycled Asphalt Concrete Material and the Base AC Dense Graded "D" Mix Virgin Asphalt Concrete Material. June 22, 1995 was the second day of paving where the contractor proceeded with the Binder AC Dense Graded "B" Mix Virgin and Recycled Asphalt Concrete Material and started with the Surface AC Dense Graded "C" Mix Virgin and Recycled Asphalt Concrete Material. The third and last day of paving on the SPS-5 site was the 27th of June 1995 when the contractor finished laying the Surface AC Dense Graded "C" Mix Virgin and Recycled Asphalt Concrete Material on the experimental sections.

Rod and Level elevation shots were taken on top of the original existing surface (Figure 3 Elev. 1) and on top of each layer or after each surface preparation. Five shots were taken across the width of the SPS travel lane at 15.24 m intervals starting at station 0+00 and finishing at station 5+00, total 55 shots per section per layer.

The rate of change in the condition of the control section 230501, which does not receive an overlay or extensive repairs, is intended to be an indicator of the change expected on the other test sections had they not been rehabilitated. Also, the change in the FWD deflections at the control section, a short period before and after the overlay of the other sections, can be used as an indication of the climatic influence.

Surface Condition and Preparation

There was no surface preparation performed on the minimum surface preparation sections. The SPS-5 experiment allows the state to do leveling, crack sealing, and patching on the existing surface if needed. MDOT did not include any such activities in the project although the sites contained longitudinal and transverse cracks, as well as deep ruts in the wheel paths, photos in Appendix B.

Surface preparation was only done at the intensive surface preparation sections where milling was performed. The contractor used a ROTO-MILL Pavement Profiler model type PR-500-FL manufactured by CMI Corporation, Oklahoma City. The milling operation started in the morning of June 17, 1995 with section 230506 and finished with section 230509 on the same day. The SPS-5 travel lane was milled in two passes. First the side next to the centerline was milled with a width of 2.16 m then the side next to the outside shoulder with a width of 1.65 m. The contractor started from the transition of section 230506 at station 0-81. The centerline side of section 230506 was milled first,

next 230507 then 230508 and finally 230509. The contractor then moved back to 0-81 of section 230506 and started milling the side next to the outside shoulder, finishing again at station 5+61 of section 230509. He then moved back to the same starting location and did the outside shoulder in two passes starting with the side next to the travel lane and finally the side next to the fore slope. All milling was done to a depth of 38 mm. The passing lane and the inside shoulder adjacent to sections 230506 and 230509 were also milled on the afternoon of the same day. The milled SPS-5 sections were opened to traffic for five hours after milling to allow for traffic flow during milling of the passing and inside shoulder lanes.

A tack coat of Asphalt Emulsion Grade HFMS-1 from Bangor ME (Specific Gravity 0.9978), was applied to the existing asphalt concrete surface and the milled surface, as well as the edge of the adjacent lane that was overlaid earlier.

Elevation shots were taken on the surface of the milled areas, as shown in Figure 3 Elev 2, on June 19, 1995 by the MDOT staff.

AC Dense Graded Shim "D" Mix Virgin Base Layer Preparation

This mix was only used in the MDOT supplemental section 230559. Paving of this layer was done on June 20, 1995 with a minimum thickness of 19 mm and set for correcting the cross-slope. The job mix formula for this layer is presented in Appendix A. A bulk sample of the loose fresh mix was collected from the paver hopper, while at station 2+50 of section 230559. Three 19-liter pails were collected from this location and sent to MDOT lab for testing as part of the SPS-5 experiment, Table 7.

Elevation shots were collected on the surface of this layer on the same day of paving, Figure 3 Elev. 4. The results, presented in Table 13, indicated the base layer exceeded the specification thickness limit of 19 mm $\pm$ 8 mm. The reason for this excess thickness was the rutting in the wheel paths and the aim was mainly to correct the cross-slope before proceeding with the paving of the other layer.

AC Dense Graded "B" Mix Virgin and Recycled Binder Layer Preparation

The recycled binder mix was used in sections 230503, 230508, and 230509 while the virgin binder mix was used in sections 230504, 230506, and 230507. Paving of this layer started on June 20, 1995 and was finished, during the second day of paving, on June 22, 1995. Sections 230503 and 230504 were paved with 76 mm of material placed in two equal lifts. The first lift was used to correct the cross-slope. Sections 230506 and 230509 were paved with one lift of 38 mm of the binder layer to replace the milled surface. Sections 230507 and 230508 were paved with three equal lifts of 38 mm each, the first to replace the milled surface and the other two to give the overlay thickness of 76 mm as specified by the SPS-5 experimental guidelines. The job mix formulas for the virgin and recycled binder layers are presented in Appendix A. Bulk samples of the loose fresh virgin and recycled binder material were collected from the paver hopper while at station 2+50 of sections 230503, 230504, 230506, 230507, 230508, and 230509. Three 19-liter pails were collected from each location of sections 230506 and 230509 and sent to MDOT lab for testing as part of the SPS-5 experiment, Table 7. Six 19-liter pails were collected from each location of sections 230503, 230504, 230507, and 230508, three of each were shipped to the MDOT lab in Bangor ME for testing as part of the SPS-5 experiment, as shown in Table 7, and three to be shipped to MRL for storage. Table 4 identifies the

samples to be collected for the MDOT lab for testing as part of the SPS-5 experiment and for the MRL facility for storage.

Elevations shots on top of the mill replacement layer (Figure 3 Elev. 3) and on top of the final lift of this layer (Figure 3 Elev. 4) were collected by MDOT staff on the same day of paving. The results, presented in Table 13, indicate that the thickness was over the design specification, especially when this layer was used to correct for cross-slope.

AC Dense Graded "C" Mix Virgin and Recycled Surface Layer Preparation

The same paving and compaction equipment was used for the surface layer as for the AC base and binder courses (job mix formulas of the virgin and recycled material used by the asphalt plant is provided in Appendix A). This material was used for paving the top layer of all the sections including the MDOT supplemental section 230559. The recycled mix was used in sections 230502, 230503, 230508, and 230509, while the virgin mix was used in sections 230504, 230505, 230506, 230507, and 230559. Paving started on June 22, 1995 and was completed on the third day of paving, June 27, 1995. Sections 230502 and 230505 had two lifts of the surface mix, the first was 19 mm, which was used to correct cross-slope, and the second and final lift was 32 mm. Section 230559 was paved with 32 mm of the surface mix giving a total overlay of 51 mm of the base and surface layers. All other sections were paved with one lift of 51 mm of this mix. Bulk samples of the loose fresh recycled and virgin mixes were collected from the paver at the time of the paving operation while at station 2+50 of sections 230503, 230504, 230507, and 230508. Six 19-liter pails were collected from each location, three of each were shipped to the MDOT lab in Bangor ME for testing as part of the SPS-5 experiment, as shown in Table 7, and three to be shipped to MRL for storage. Table 4 identifies the samples to be collected for the MDOT lab for testing as part of the SPS-5 experiment and for the MRL facility for storage.

Elevations shots on top of the final lift of this layer (Figure 3 Elev. 5) were collected by MDOT staff on the same day of paving. The results, presented in Table 13, indicated that the thicknesses were within the specification limits except for sections 230502, 230505, and 230559 where the thicknesses were over the design specification, especially when this layer was used to correct for cross-slope. In-situ densities were measured at 30 locations, covering the ten sections, by Nancy Bradbury of MDOT, on October 5, 1995. Values of the measured in situ densities are presented in Table 9. Cores of the asphalt concrete layers, from the sampling areas, were collected by Craig Thompson of MDOT on October 3 and 4, 1995. Table 12 lists the thicknesses of all the cores collected on that day.

Asphalt Cement and Aggregate Sampling

The asphalt plant was visited on June 21, 1995 and pictures were taken throughout the plant site, Photos in Appendix B. Samples were taken of the asphalt cement and the recycled material and virgin combined aggregate of each layer, virgin and recycled, used in all the asphalt concrete paving. Six 19-liter pails of asphalt cement were collected from the plant on June 20, 1995, three were sent to MDOT lab to be used in the SPS-5 laboratory testing and three were shipped to MRL. Five 208-liter drums of the recycled material and the combined aggregate were also collected from the asphalt plant and shipped to MRL. The recycled material and the combined aggregate of the virgin "B" binder mix were collected on June 20, 1995. The combined aggregate of the recycled "B"

binder mix was collected on June 22, 1995. Both virgin and recycled "C" mix surface combined aggregate were collected from the plant on June 27, 1995.

Deviations from the Construction Guidelines

In the minimal preparation sections, the SPS-5 Construction Guidelines require an asphaltic concrete leveling course to be placed in ruts greater than 12.7 mm deep prior to overlay. This course is to be placed within the depressed areas only and not as a thin layer covering the entire surface of the test section. In this project no leveling course was used, although ruts were in most cases more than 12.7 mm deep, Table 15. The first overlay lift on the existing surface was used to fill the depressed areas as well as cover the entire width of the section. Also in the minimal preparation sections, the Guidelines require that cracks which are more than 19.1 mm wide be repaired with patches. Again this was not done although in some areas the longitudinal cracks at the edge of pavement and at the centerline, as well as the transverse cracks, were as wide as 100 mm.

Also according to the SPS-5 Construction Guidelines, the as-compacted thickness of the asphalt concrete overlay (surface plus binder plus base) in the test sections shall be constructed to within $\pm$ 8 mm of the value specified in the experimental design (i.e. 51 $\pm$ 8 mm for sections 230502, 230505, 230506, 230509, and 230559, and 127 $\pm$ 8 mm for sections 230503, 230504, 230507, and 230508). From Tables 12 and 13, it is obvious that some of the AC thicknesses, from the cores and the Rod and Level elevation measurements, are outside the limits. The difference was more in the first lift or layer placed on the existing or milled surface, since this was used to correct the cross-slope and to take care of the rutting existing in the wheel paths.

V. Post Construction Operations and Initial Performance

The site was marked during the first week of August 1995 according to the guidelines. Figure 5 shows the paint marks used on the sections to identify the location of the beginning of each of the sections and at 30.5 m intervals.

Profilometer testing was performed on August 15, 1995 after marking the site. The average International Roughness Index (IRI) values from five runs for each of the ten sections, before and after construction, are presented in Table 14. Plots of the elevation measurements, in the left wheel path and the right wheel path, from all the sites, before and after construction, are presented in Figures 6 to 15. The site was also videoed on August 16, 1995.

The Falling Weight Deflectometer (FWD) and Manual Distress Survey (MDS), including transverse Dipstick measurements, on the final layer of the sections were performed on October 3, 4, and 5, 1995. The rut depth values in the left and right wheel paths, as determined from the Dipstick, before and after construction, are summarized in Table 15 and plotted in Figures 16 to 25.

During the initial monitoring period, July to October 1995, the site was reported as having no obvious distresses except for low severity bleeding in the wheel paths throughout the entire length of the project.

Table 1. Site Layout, SPS-5 Project 230500 on North Bound I-95

Constr-uction Stations	Experi-mental Stations	Length (m)	AC Overlay Thickness mm	AC Overlay Type	Surface Preparation	Section ID
1215+00 - 1220+00	0+00 - 5+00	152.4	0 Top 0 Binder 0 BMR 0 Base	None	None	**230501**
1222+70 - 1227+70	0+00 - 5+00	152.4	51 Top 0 Binder 0 BMR 0 Base	30% RAP	None	**230502**
1230+90 - 1235+90	0+00 - 5+00	152.4	51 Top 76 Binder 0 BMR 0 Base	30% RAP	None	**230503**
1237+60 - 1242+60	0+00 - 5+00	152.4	51 Top 76 Binder 0 BMR 0 Base	Virgin	None	**230504**
1245+80 - 1250+80	0+00 - 5+00	152.4	51 Top 0 Binder 0 BMR 0 Base	Virgin	None	**230505**
1252+60 - 1257+60	0+00 - 5+00	152.4	51 Top 0 Binder 38 BMR 0 Base	Virgin	Milling 38 mm	**230506**
1260+80 - 1265+80	0+00 - 5+00	152.4	51 Top 76 Binder 38 BMR 0 Base	Virgin	Milling 38 mm	**230507**
1267+60 - 1272+60	0+00 - 5+00	152.4	51 Top 76 Binder 38 BMR 0 Base	30% RAP	Milling 38 mm	**230508**
1275+80 - 1280+80	0+00 - 5+00	152.4	51 Top 0 Binder 38 BMR 0 Base	30% RAP	Milling 38 mm	**230509**
1282+80 - 1287+80	0+00 - 5+00	152.4	32 Top 0 Binder 0 BMR 19 Base	Virgin	None	**230559**

Note: Top -AC Dense Graded "C" Mix Virgin or Recycled Asphalt Concrete Surface Layer
Binder -AC Dense Graded "B" Mix Virgin or Recycled Asphalt Concrete Binder Layer
BMR -AC Dense Graded "B" Mix Virgin or Recycled Asphalt Concrete Binder Mill Replacement Layer
Base -AC Dense Graded "D" Mix Virgin Shim Asphalt Concrete Base Layer

Table 2. Scope of Field Testing, Pre and Post Construction

Pre Construction

Layer	Number of Tests	Location Designation
Asphalt Concrete Surface In-Situ Density (Nuclear Gauge)	-	-
Unbound Base In-Situ Density and Moisture Content (NG)	2	TP1-TP2
Unbound Subbase In-Situ Density and Moisture Content (NG)	2	TP1-TP2
Subgrade In-Situ Density and Moisture Content (NG)	2	TP1-TP2

Post Construction

Layer	Number of Tests	Location Designation
Asphalt Concrete Surface In-Situ Density (Nuclear Gauge)	30	T1-T30
Unbound Base In-Situ Density and Moisture Content (NG)	-	-
Unbound Subbase In-Situ Density and Moisture Content (NG)	-	-
Subgrade In-Situ Density and Moisture Content (NG)	-	-

Table 3. Scope of Material Sampling, Pre, During, and Post Construction

Pre Construction

Layer	Number of Samples	Sample Location
Asphalt Concrete		
Coring - 102 mm Diameter	35	C1-C32,C79-C81
Coring - 152 mm Diameter	3	A2-A4
Coring - 305 mm Diameter	6	BA1-BA6
Block - 305x305 mm *	4	TP1-TP2
Unbound Base		
Bulk Sampling		
23 kg samples	6	BA1-BA6
91 kg samples	2	TP1-TP2
Moisture Content Samples	8	BA1-BA6, TP1-TP2
Unbound Subbase		
Bulk Sampling		
23 kg samples	6	BA1-BA6
91 kg samples	2	TP1-TP2
Moisture Content Samples	8	BA1-BA6, TP1-TP2
Subgrade		
Split Spoon Sampling (2 samples per hole) **	8	A1-A4
Bulk Sampling		
23 kg samples	6	BA1-BA6
91 kg samples	2	TP1-TP2
Moisture Content Samples	8	BA1-BA6, TP1-TP2
Shoulder Auger Probes (Depth to Rigid Layer)	3	S1-S3

* Note: Two blocks from Test Pit location TP1, and two blocks from Test Pit location TP2.

** Note: Total of 3 samples were retrieved, one from location A1 and two from location A2.

Table 3(Cont.). Scope of Material Sampling, Pre, During, and Post Construction

During Construction

Layer	Number of Samples	Sample Location
Asphalt Concrete		
AC Bulk Sampling		
Virgin AC Surface Mix	3	BV4-BV6
Recycled AC Surface Mix	3	BR4-BR6
Virgin AC Binder Mix	3	BV1-BV3
Recycled AC Binder Mix	3	BR1-BR3
Virgin AC Base Mix (3-20 kg bucket each sample, uncompacted)	1	B1 (from paver hopper)
Asphalt Cement (3-19 liter bucket each sample)	1	BC01 (from asphalt plant)

Post Construction

Layer	Number of Samples	Sample Location
Asphalt Concrete Coring - 102 mm Diameter	51	C33-C78,C82-C86

Table 4. Bulk Material Sampling During Construction

A. Materials for Testing as Part of the SPS-5 Experiment

Material Description	Number of Samples	Quantity of Each Sample	Sample Location
Virgin AC Surface	3	3-20 kg buckets	BV4-BV6
Recycled AC Surface	3	3-20 kg buckets	BR4-BR6
Virgin AC Binder	3	3-20 kg buckets	BV1-BV3
Recycled AC Binder	3	3-20 kg buckets	BR1-BR3
Virgin AC Base	1	3-20 kg buckets	B1
AC Cement	1	1-19 liter bucket	Asphalt Plant

B. Materials for Shipping to the SHRP Materials Reference Library

Material Description	Number of Samples	Quantity of Each Sample	Sample Location
Virgin AC Surface	2	3-20 kg buckets	BV4 & BV6
Recycled AC Surface	2	3-20 kg buckets	BR4 & BR5
Virgin AC Binder	2	3-20 kg buckets	BV1 & BV3
Recycled AC Binder	2	3-20 kg buckets	BR1 & BR2
AC Cement	1	2-19 liter buckets	Asphalt Plant
Combined Aggregate (Uncoated)			
As used in the Virgin Surface Mix	1	1-208 liter drum	Asphalt Plant
As used in the Recycled Surface Mix	1	1-208 liter drum	Asphalt Plant
As used in the Virgin Binder Mix	1	1-208 liter drum	Asphalt Plant
As used in the Recycled Binder Mix	1	1-208 liter drum	Asphalt Plant

Table 5. Field Activities Pre, During, and Post Construction

	Pre Construction		During and Post Construction				
	Subgrade Subbase Base Layers	**Existing AC Layer**	**Overlay AC BMR* Layer**	**Overlay AC Base/ Binder Layer**	**Overlay AC Surface Layer**	**AC Cement Material**	**Combined Aggregate Material**
In-Situ Density	94/06/06 94/06/07				95/10/05		
Split Spoon Sampling	94/06/07 94/06/08						
Shoulder Probe	94/06/06 94/06/08						
Bulk and Moisture Sampling	94/06/06 94/06/07 94/06/08		95/06/20	95/06/20 95/06/22	95/06/27	95/06/20	95/06/20 95/06/22 95/06/27
Rod&Level Elevations **		95/06/01 *elev. #1* 95/06/19 *elev. #2*	95/06/20 *elev. #3*	95/06/20 95/06/22 *elev. #4*	95/06/27 *elev. #5*		
Photos Taken	94/06/06 94/06/07 95/06/08	95/04/27 95/06/17 95/06/19	95/06/20	95/06/20 95/06/22	95/06/27 95/10/03 95/10/05		
Video Recording		95/04/20			95/08/16		
Site Markings					95/08/08		
Profilometer Testing		95/04/20 95/04/21			95/08/15		
FWD Testing***		94/06/06 95/04/24 95/04/25 95/04/26			95/10/03 95/10/04		
MDS and Dipstick Survey		95/04/24 95/04/25 95/04/26			95/10/03 95/10/04 95/10/05		
Coring		94/06/06 94/06/07 94/06/08			95/10/03 95/10/04		

Date format is in yy/mm/dd

* Note: BMR Binder Mill Replacement Layer.

** Note: Refer to Figure 3 for elevation number locations.

***Note: FWD Testing of June 06, 1994 was on the Test Pit Locations only.

Table 6. Guidelines vs. Actual Monitoring Measurement Dates, Before and After Construction

Before Construction

Measurement Type	Monitoring Period Before Construction	Monitoring Date as per the Guidelines - Construction Started June 17, 1995	Actual Monitoring Date Started and Completed
Deflection	< 3 Months	After March 17, 1995	April 24, 1995 April 26, 1995
Profile	< 3 Months	After March 17, 1995	April 20, 1995 April 21, 1995
Distress Survey	< 6 Months	After Dec. 17, 1994	April 24, 1995 April 26, 1995
Friction	< 12 Months	After June 17, 1994	

After Construction

Measurement Type	Monitoring Period After Construction	Monitoring Date as per the Guidelines - Construction Finished June 27, 1995	Actual Monitoring Date Started and Completed
Deflection	1-3 Months*	July 27 - Sep. 27, 1995	October 3, 1995 October 4, 1995
Profile	< 2 Months	Before Aug. 27, 1995	August 15, 1995 August 15, 1995
Distress Survey	< 6 Months	Before Dec. 27, 1995	October 3, 1995 October 5, 1995
Friction	3-12 Months	September 27, 1995 - July 27, 1996	

* Note: The LTPP Manual for FWD Testing, Version 2.0/February 1993, requires that FWD testing for SPS-5 be performed 3 to 6 months after overlay construction is completed.

Table 7. Field and Laboratory Material Testing, Before, During, and After Construction

Before Construction

Test Type	SHRP Test Desig.	SHRP Prot-ocol	Tests per Layer	Material Source /Test Location
SUBGRADE				
Sieve Analysis	SS01	P51	2	TP1,TP2
Hydrometer to 0.001 mm	SS02	P42	2	TP1,TP2
Atterberg Limits	SS03	P43	2	TP1,TP2
Classification	SS04	P52	8	A1,A2,A3,A4,(BA1-3),(BA4-6),TP1,TP2
Moisture/Density Relations	SS05	P55	2	TP1,TP2
Resilient Modulus	SS07	P46	2	TP1,TP2
Natural Moisture Content	SS09	P49	4	(BA1-3),(BA4-6),TP1,TP2
Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter	SS11	P57	2	(BA1-3),(BA4-6)
Nuclear Density/Moisture		LTPP	2	TP1,TP2
Depth to Rigid Layer		LTPP	3	S1,S2,S3
UNBOUND GRANULAR SUBBASE				
Particle Size Analysis	UG01	P41	2	TP1,TP2
Sieve Analysis (washed)	UG02	P41	2	TP1,TP2
Atterberg Limits	UG04	P43	2	TP1,TP2
Moisture/Density Relations	UG05	P44	2	TP1,TP2
Resilient Modulus	UG07	P46	2	TP1,TP2
Classification	UG08	P47	4	(BA1-3),(BA4-6),TP1,TP2
Permeability	UG09	P48	2	(BA1-3),(BA4-6)
Natural Moisture Content	UG10	P49	4	(BA1-3),(BA4-6),TP1,TP2
Nuclear Density/Moisture		LTPP	2	TP1,TP2
UNBOUND GRANULAR BASE				
Particle Size Analysis	UG01	P41	2	TP1,TP2
Sieve Analysis (washed)	UG02	P41	2	TP1,TP2
Atterberg Limits	UG04	P43	2	TP1,TP2
Moisture/Density Relations	UG05	P44	2	TP1,TP2
Resilient Modulus	UG07	P46	2	TP1,TP2
Classification	UG08	P47	4	(BA1-3),(BA4-6),TP1,TP2
Permeability	UG09	P48	2	(BA1-3),(BA4-6)
Natural Moisture Content	UG10	P49	4	(BA1-3),(BA4-6),TP1,TP2
Nuclear Density/Moisture		LTPP	2	TP1,TP2

Note: Cores within brackets are from the same sampling area.

Table 7(Cont.). Field and Laboratory Material Testing, Before, During, and After Construction

Before Construction (Cont.)

Test Type	SHRP Test Desig.	SHRP Prot-ocol	Tests per Layer	Material Source /Test Location
EXISTING ASPHALT CONCRETE				
Core Exam./Thickness	AC01	P01	35	All C Type Cores
Bulk Specific Gravity	AC02	P02	35	All C Type Cores
Maximum Specific Gravity	AC03	P03	4	(BA1-3),(BA4-6),TP1,TP2
Asphalt Content (Extraction)	AC04	P04	4	(BA1-3),(BA4-6),TP1,TP2
Creep Compliance*	AC06	P06	4	[C1-3],[C12-14],[C19-21],[C26-28]*
Resilient Modulus	AC07	P07	4	(C5-7),(C15-17),(C23-25),(C30-32)
Tensile Strength	AC07	P07	4	(C5-7,C79),(C15-18),(C23-25,C80),(C30-32,C81)
Field Moisture Damage	AC08	P08	3	A1,TP1,TP2
EXTRACTED AGGREGATE				
Type and Classification:				
Coarse Aggregate	AG03	P13	4	(BA1-3),(BA4-6),TP1,TP2
Fine Aggregate	AG03	P13	4	(BA1-3),(BA4-6),TP1,TP2
Gradation of Aggregate	AG04	P14	4	(BA1-3),(BA4-6),TP1,TP2
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	4	(BA1-3),(BA4-6),TP1,TP2
ASPHALT CEMENT				
Abson Recovery	AE01	P21	4	(BA1-3),(BA4-6),TP1,TP2
Penetration at 25C, 46C	AE02	P22	4	(BA1-3),(BA4-6),TP1,TP2
Specific Gravity at 16C	AE03	P23	4	(BA1-3),(BA4-6),TP1,TP2
Viscosity at 25C	AE04	P24	4	(BA1-3),(BA4-6),TP1,TP2
Viscosity at 60C, 135C	AE05	P25	4	(BA1-3),(BA4-6),TP1,TP2

Note: Cores within brackets are from the same sampling area.

*Note: 4" thick creep compliance test specimen may require that it be made from two or more cores in [ ].

Table 7(Cont.). Field and Laboratory Material Testing, Before, During, and After Construction

During and After Construction

Test Type	SHRP Test Desig.	SHRP Prot-ocol	Tests per Layer	Material Source /Test Location
AC SURFACE, BINDER, AND BASE				
Core Exam./Thickness	AC01	P01	51	All Cores
Bulk Specific Gravity	AC02	P02	51	All Cores
Maximum Specific Gravity	AC03	P03	13	BV1-BV6,BR1-BR6,B1
Asphalt Content (Extraction)	AC04	P04	13	BV1-BV6,BR1-BR6,B1
Moisture Susceptibility	AC05	P05	13	BV1-BV6,BR1-BR6,B1
Creep Compliance*	AC06	P06	5	[C37-39],[C43-45],[C57-59],[C63-65], [C73-C75]*
Resilient Modulus	AC07	P07	5	(C40-42),(C46-48),(C60-62),(C66-68), (C76-C78)
Tensile Strength	AC07	P07	5	(C40-42,C82),(C46-48,C83),(C60-62, C84),(C66-68,C85),(C76-C78,C86)
EXTRACTED AGGREGATE				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	13	BV1-BV6,BR1-BR6,B1
Fine Aggregate	AG02	P12	13	BV1-BV6,BR1-BR6,B1
Type and Classification:				
Coarse Aggregate	AG03	P13	13	BV1-BV6,BR1-BR6,B1
Fine Aggregate	AG03	P13	13	BV1-BV6,BR1-BR6,B1
Gradation of Aggregate	AG04	P14	13	BV1-BV6,BR1-BR6,B1
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	13	BV1-BV6,BR1-BR6,B1
ASPHALT CEMENT				
Abson Recovery	AE01	P21	13	BV1-BV6,BR1-BR6,B1
Penetration at 25C, 46C	AE02	P22	13	BV1-BV6,BR1-BR6,B1
Specific Gravity at 16C	AE03	P23	13	BV1-BV6,BR1-BR6,B1
Viscosity at 25C	AE04	P24	13	BV1-BV6,BR1-BR6,B1
Viscosity at 60C	AE05	P25	13	BV1-BV6,BR1-BR6,B1
ASPHALT CEMENT (from tanker)				
Penetration at 25C, 46C	AE02	P22	1	BC01
Specific Gravity at 16C	AE03	P23	1	BC01
Viscosity at 25C	AE04	P24	1	BC01
Viscosity at 60C	AE05	P25	1	BC01

Note: Cores within brackets are from the same sampling area.

*Note: 4" thick creep compliance test specimen may require that it be made from two or more cores in [ ].

Table 8. Construction Geometrics and Dates

Section ID and Layer Thicknesses (mm)		Milling Completed yy/mm/dd	AC BMR Paving yy/mm/dd	AC BASE Paving yy/mm/dd	AC BINDER Paving yy/mm/dd	AC TOP Paving yy/mm/dd
230501	0 TOP 0 BINDER 0 BMR 0 BASE	-	-	-	-	-
230502	51 TOP 0 BINDER 0 BMR 0 BASE	-	-	-	-	2 lifts 95/06/22 95/06/27
230503	51 TOP 76 BINDER 0 BMR 0 BASE	-	-	-	2 lifts 95/06/20 95/06/22	95/06/27
230504	51 TOP 76 BINDER 0 BMR 0 BASE	-	-	-	2 lifts 95/06/20 95/06/22	95/06/27
230505	51 TOP 0 BINDER 0 BMR 0 BASE	-	-	-	-	2 lifts 95/06/22 95/06/27
230506	51 TOP 0 BINDER 38 BMR 0 BASE	95/06/17	95/06/20	-	-	95/06/27
230507	51 TOP 76 BINDER 38 BMR 0 BASE	95/06/17	95/06/20	-	2 lifts 95/06/22 95/06/22	95/06/27
230508	51 TOP 76 BINDER 38 BMR 0 BASE	95/06/17	95/06/20	-	2 lifts 95/06/22 95/06/22	95/06/27
230509	51 TOP 0 BINDER 38 BMR 0 BASE	95/06/17	95/06/20	-	-	95/06/27
230559	32 TOP 0 BINDER 0 BMR 19 BASE	-	-	95/06/20	-	95/06/27

Note: TOP -AC Dense Graded "C" Mix Virgin or Recycled Asphalt Concrete Surface Layer
BINDER -AC Dense Graded "B" Mix Virgin or Recycled Asphalt Concrete Binder Layer
BMR -AC Dense Graded "B" Mix Virgin or Recycled Asphalt Concrete Binder Mill Replacement Layer
BASE -AC Dense Graded "D" Mix Virgin Shim Asphalt Concrete Base Layer

Table 9. Nuclear Gauge In Situ Densities and Moisture Contents, Before and After Construction

Before Construction

Section ID & Location	230506 TP1 Station 5+20			230559 TP2 Station 5+40		
Layer	Subgrade	Subbase	Base	Subgrade	Subbase	Base
Date yy/mm/dd	94/06/06	94/06/06	94/06/06	94/06/07	94/06/07	94/06/07
Depth from Surface to top of existing pavement	559 mm	330 mm	229 mm	559 mm	330 mm	229 mm

Density* kg/m^3

Direct Transmission Rod Depth	305 mm	203 mm	102 mm	305 mm	203 mm	102 mm
Test Pit Station 5+20						
Wet Density	2131	2194	2087	2350	2032	2213
Dry Density	2037	2096	2003	2200	1939	2130

Moisture**

Direct Transmission Rod Depth	305 mm	203 mm	102 mm	305 mm	203 mm	102 mm
Test Pit Station 5+20						
Back Scatter	8.5	8.2	8.7	14.5***	7.2	8.3
Direct Transmission	4.6	4.8	4.4	6.8***	4.7	4.0

Notes:

* Density is measured in the Direct Transmission method (rod depth given in mm).

** Moisture is measured in both the Direct Transmission method (rod depth given in mm) and the Back Scatter method.

*** Moisture values are questionable due to heavy rain, water standing was vacuumed before testing but material was completely saturated.

Table 9(Cont.). Nuclear Gauge In Situ Densities and Moisture Contents, Before and After Construction

After Construction

Density (kg/m^3)

Section ID	Station 1+00	Station 2+50	Station 4+00
230501	2339*	2346*	2357*
230502	2314	2286	2301
230503	2342	2371	2374
230504	2395	2355	2381
230505	2248	2312	2278
230506	2317	2301	2269
230507	2376	2374	2370
230508	2331	2339	2330
230509	2333	2256	2296
230559	2390	2309	2381

Notes: Densities are measured in the Back Scatter Method.
Testing Date October 5, 1995 on top of the Overlay Surface Layer.
Readings are taken in the middle of the lane at 1.8 m offset from the edge of pavement.
Troxler Thin Layer Density Gauge 4640B was used.
* Density of the existing old surface.

Table 10. Asphalt Concrete Laydown Temperatures During Paving

Section ID	Overlay AC Base Layer Temperature °C	Overlay AC Binder Layer Temperature °C	Overlay AC Surface Layer Temperature °C
230501	no base	no binder	no surface
230502	no base	no binder	138 141
230503	no base	141	135*
230504	no base	149	138
230505	no base	no binder	135 149
230506	no base	138	138
230507	no base	135 141** 146 154	135
230508	no base	138	135
230509	no base	135 138	138
230559	135	no binder	138

Notes: Air temperature and weather conditions, during paving, are summarized in Table 11.
Mixing temperature is 138 °C.
All temperature measurements (except for two) are from the hauling trucks.
* Temperature measurement from paver hopper while at 4+25.
** Temperature measurement from roadway at 4+00.

Table 11. Paving Dates, Times, Locations, Thicknesses, and Weather Conditions

Date	Time	Section ID	AC Layer	Lift Number	Thick(mm)	Material Type	Weather
June 20, 95	0630-0720	230503	Binder	1st lift	38	30%RAP	Sunny 32°C @ 1245
	0738-0830	230504	Binder	1st lift	38	VIRGIN	
	0850-0920	230506	Binder	1st lift *	38	VIRGIN	
	0933-0958	230507	Binder	1st lift *	38	VIRGIN	
	1022-1037	230508	Binder	1st lift *	38	30%RAP	
	1104-1128	230509	Binder	1st lift *	38	30%RAP	
	1616-1630	230559	Base	only lift	19	VIRGIN	
June 22, 95	0645-0658	230502	Surface	1st lift	19	30%RAP	Sunny 30°C @ 0900
	0801-0820	230503	Binder	2nd lift	38	30%RAP	
	0929-0945	230504	Binder	2nd lift	38	VIRGIN	
	1100-1111	230505	Surface	1st lift	19	VIRGIN	
	1224-1238	230507	Binder	2nd lift	38	VIRGIN	
	1348-1413	230508	Binder	2nd lift	38	30%RAP	
	1525-1538	230507	Binder	3rd lift	38	VIRGIN	
	1642-1650	230508	Binder	3rd lift	38	30%RAP	
June 27, 95	0636-0650	230502	Surface	2nd lift	32	30%RAP	Sunny 28°C @ 0900
	0705-0732	230503	Surface	only lift	51	30%RAP	
	0741-0757	230504	Surface	only lift	51	VIRGIN	
	0810-0822	230505	Surface	2nd lift	32	VIRGIN	
	0827-0840	230506	Surface	only lift	51	VIRGIN	
	0848-0917	230507	Surface	only lift	51	VIRGIN	
	0931-0948	230508	Surface	only lift	51	30%RAP	
	0955-1016	230509	Surface	only lift	51	30%RAP	
	1030-1041	230559	Surface	only lift	32	VIRGIN	

Note: Surface - AC Dense Graded "C" Mix Virgin or Recycled Asphalt Concrete Surface Layer
Binder - AC Dense Graded "B" Mix Virgin or Recycled Asphalt Concrete Binder Layer
Base - AC Dense Graded "D" Mix Virgin Shim Asphalt Concrete Base Layer
* This 1st lift of Binder is replacing the milled pavement (Binder Mill Replacement Layer)

Table 12. Core Thicknesses from the Field Material Sampling and Testing Forms, Before and After Construction

Before Construction

	Before Section					After Section				
Section ID	Station	Offset m	Core Size mm	Core #	Thick. H mm	Station	Offset m	Core Size mm	Core #	Thick. H mm
230501	0-40	0.91	102	CA01	218	5+40	0.91	102	CA02	226
230502	0-40	0.91	102	CA03	224	5+25	0.61	102	CA05	226
	0-40	1.83	102	CA04	234	5+25	1.07	102	CA06	221
						5+25	1.52	102	CA07	229
						5+25	1.98	102	CA79	239
						5+30	0.91	152	CA51	224
						5+35	0.91	305	CA62	226
						5+40	1.83	305	CA61	236
						5+45	0.91	305	CA63	224
230503	0-40	0.91	102	CA08	229	5+40	0.91	102	CA09	231
230504	0-40	0.91	102	CA10	216	5+40	0.91	102	CA11	211
230505	0-40	0.91	102	CA12	213	5+40	0.91	102	CA13	216
230506	0-40	0.91	102	CA14	216	5+05	0.61	102	CA15	218
						5+05	1.07	102	CA16	213
						5+05	1.52	102	CA17	216
						5+05	1.98	102	CA18	236
						5+10	0.91	152	CA52	208
						5+15	0.91	152	CA55	213
230507	0-40	0.91	102	CA19	216	5+40	0.91	102	CA20	229
230508	0-40	0.91	102	CA21	211	5+25	0.61	102	CA23	216
	0-40	1.83	102	CA22	241	5+25	1.07	102	CA24	229
						5+25	1.52	102	CA25	231
						5+26.5	1.98	102	CA80	241
						5+30	0.91	152	CA53	218
						5+35	0.91	305	CA65	218
						5+40	1.83	305	CA64	229
						5+45	0.91	305	CA66	218
230509	0-40	0.91	102	CA26	216	5+40	0.91	102	CA27	216
230559	0-40	0.91	102	CA28	213	5+25	0.61	102	CA30	224
	0-40	1.83	102	CA29	234	5+25	1.07	102	CA31	216
						5+25	1.52	102	CA32	236
						5+25	1.98	102	CA81	234
						5+30	0.91	152	CA54	216
						5+35	0.91	152	CA56	216

Note: Coring dates are June 6,7,8, 1994.

Table 12(Cont.). Core Thicknesses from the Field Material Sampling and Testing Forms, Before and After Construction

After Construction

		Before Section 0-45		After Section 5+45		Design Specs H + 8 mm		
Section ID	Offset m	Core #	Thickness H mm	Core #	Thickness H mm	Thickness H mm	Lower Limit	Upper Limit
230502	0.91	CA33	97*	CA35	69*	51	43	59
	1.83	CA34	74*	CA36	64*			
230503	0.61	CA37	119	CA40	124	127	119	135
	1.07	CA38	140*	CA41	132			
	1.52	CA39	135	CA42	140*			
	1.98			CA82	132			
230504	0.61	CA43	137*	CA46	135	127	119	135
	1.07	CA44	150*	CA47	142*			
	1.52	CA45	152*	CA48	137*			
	1.98			CA83	132			
230505	0.91	CA49	69*	CA87	64*	51	43	59
	1.83	CA50	56	CA88	64*			
230506	0.91	CA89	56	CA97	51	51**	43	59
	1.83	CA90	58	CA98	51	89***	81	97
230507	0.61	CA57	127	CA60	132	127**	119	135
	1.07	CA58	132	CA91	132	165***	157	173
	1.52	CA59	152*	CA92	132			
	1.98			CA84	132			
230508	0.61	CA93	135	CA96	119	127**	119	135
	1.07	CA94	135	CA67	119	165***	157	173
	1.52	CA95	135	CA68	124			
	1.98			CA85	124			
230509	0.91	CA69	48	CA71	53	51**	43	59
	1.83	CA70	53	CA72	56	89***	81	97
230559	0.61	CA73	69*	CA76	89*	51	43	59
	1.07	CA74	79*	CA77	89*			
	1.52	CA75	76*	CA78	86*			
	1.98			CA86	79*			

Notes: Coring dates are October 3,4, 1995.
Measurements were done on site and may not be accurate, the thicknesses from the rod and level measurements (Table 13) are much more reliable.
* Outside specification thickness limits.
** Thickness of overlay without considering the mill replacement layer.
*** Thickness of overlay including the mill replacement layer.

Table 13. Layer Thicknesses from Rod and Level Elevations

		230502		230503			230504		
Offset (meters)	Location	Spec Thick Station	51 mm SURF	Spec Thick Station	76 mm BIND	51 mm SURF	Spec Thick Station	76 mm BIND	51 mm SURF
0	EOP	1222+70	90	1230+90	80	60	1237+60	80	45
0.91	OWP		115		95	55		90	50
1.83	MID		95		85	55		85	60
2.74	IWP		100		100	50		95	55
3.66	CL		80		85	55		80	55
0	EOP	1223+20	100	1231+40	80	45	1238+10	80	45
0.91	OWP		110		100	40		95	55
1.83	MID		90		85	50		90	55
2.74	IWP		100		90	60		95	50
3.66	CL		85		80	60		100	35
0	EOP	1223+70	90	1231+90	85	45	1238+60	90	55
0.91	OWP		100		95	45		105	55
1.83	MID		95		85	55		90	60
2.74	IWP		105		100	50		95	60
3.66	CL		80		80	50		80	55
0	EOP	1224+20	80	1232+40	90	45	1239+10	90	40
0.91	OWP		90		95	50		100	45
1.83	MID		80		85	50		95	45
2.74	IWP		100		100	50		95	55
3.66	CL		85		90	45		85	50
0	EOP	1224+70	80	1232+90	85	40	1239+60	105	40
0.91	OWP		95		95	50		115	45
1.83	MID		85		90	50		100	50
2.74	IWP		100		100	50		105	50
3.66	CL		85		85	50		85	50
0	EOP	1225+20	75	1233+40	85	50	1240+10	110	35
0.91	OWP		90		90	55		110	45
1.83	MID		80		85	55		95	50
2.74	IWP		100		105	50		100	55
3.66	CL		85		90	50		85	50
0	EOP	1225+70	75	1233+90	90	50	1240+60	105	40
0.91	OWP		90		105	50		115	50
1.83	MID		85		95	50		95	50
2.74	IWP		100		105	50		105	50
3.66	CL		85		85	50		85	45
0	EOP	1226+20	85	1234+40	80	50	1241+10	95	45
0.91	OWP		95		90	55		115	50
1.83	MID		85		80	50		95	50
2.74	IWP		100		105	50		105	50
3.66	CL		90		90	45		85	55
0	EOP	1226+70	90	1234+90	75	50	1241+60	95	40
0.91	OWP		105		90	55		110	50
1.83	MID		90		85	55		90	50
2.74	IWP		100		100	55		100	50
3.66	CL		90		85	55		80	50
0	EOP	1227+20	85	1235+40	80	45	1242+10	95	40
0.91	OWP		95		90	50		110	45
1.83	MID		85		85	45		90	50
2.74	IWP		100		100	50		100	50
3.66	CL		90		90	45		85	55
0	EOP	1227+70	95	1235+90	75	45	1242+60	75	45
0.91	OWP		100		95	50		95	50
1.83	MID		95		85	55		80	50
2.74	IWP		100		95	60		100	50
3.66	CL		90		85	60		80	50
Average	AVG		92*		90*	51		95*	49
Minimum	MIN		75		75	40		75	35
Maximum	MAX		115		105	60		115	60
Std. Dev.	DEV		9		8	5		10	6

* Note: Outside specification thickness (Spec Thick) limits of total design thickness +/- 8 mm.

Table 13(Cont.). Layer Thicknesses from Rod and Level Elevations

	230505		230506				230507				
	Spec. H	51 mm	Spec. H	38 mm	38 mm	51 mm	Spec. H	38 mm	38 mm	76 mm	51 mm
Location	Station	SURF	Station	MILL	BMR	SURF	Station	MILL	BMR	BIND	SURF
EOP	1245+80	60	1252+60	-45	50	45	1260+80	-35	55	75	50
OWP		75		-45	65	50		-20	60	75	50
MID		60		-55	65	55		-35	75	75	50
IWP		75		-30	65	45		-40	75	70	50
CL		60		-35	50	50		-50	75	65	55
EOP	1246+30	65	1253+10	-55	50	60	1261+30	-55	55	80	55
OWP		85		-30	60	50		-35	55	90	55
MID		70		-40	60	55		-45	55	85	60
IWP		85		-25	60	50		-45	70	80	55
CL		65		-40	55	55		-20	55	85	60
EOP	1246+80	60	1253+60	-30	40	55	1261+80	-50	50	80	45
OWP		80		-20	50	45		-45	60	80	45
MID		65		-45	55	55		-60	65	75	50
IWP		85		-25	50	55		-40	60	80	50
CL		60		-40	45	65		-50	50	80	50
EOP	1247+30	60	1254+10	-50	45	55	1262+30	-45	45	85	50
OWP		75		-40	50	60		-45	55	90	50
MID		65		-55	60	60		-50	60	85	50
IWP		80		-25	50	55		-35	55	90	45
CL		60		-35	45	60		-50	55	85	50
EOP	1247+80	60	1254+60	-55	55	60	1262+80	-45	50	85	55
OWP		80		-40	50	65		-40	55	90	50
MID		70		-55	60	65		-45	55	85	55
IWP		80		-30	50	60		-35	55	80	55
CL		60		-40	40	65		-50	55	80	55
EOP	1248+30	65	1255+10	-50	50	55	1263+30	-40	50	85	50
OWP		70		-30	55	50		-40	60	85	50
MID		65		-45	55	55		-50	55	85	50
IWP		80		-25	50	55		-40	55	85	50
CL		65		-35	40	60		-45	50	85	55
EOP	1248+80	65	1255+60	-45	45	45	1263+80	-50	55	75	55
OWP		85		-30	50	45		-35	55	85	50
MID		75		-40	50	55		-45	55	85	50
IWP		85		-25	50	50		-30	55	85	50
CL		65		-30	35	55		-45	50	80	55
EOP	1249+30	55	1256+10	-50	40	55	1264+30	-45	45	80	45
OWP		75		-35	45	55		-35	50	85	45
MID		70		-45	50	50		-50	55	85	45
IWP		80		-25	45	50		-30	55	85	45
CL		60		-45	40	60		-45	50	80	55
EOP	1249+80	55	1256+60	-50	30	55	1264+80	-65	55	80	50
OWP		70		-45	50	50		-40	50	90	50
MID		65		-55	50	55		-60	60	85	55
IWP		75		-35	50	55		-40	65	80	50
CL		60		-35	40	50		-50	50	80	55
EOP	1250+30	60	1257+10	-55	45	50	1265+30	-40	55	75	55
OWP		70		-40	55	50		-35	60	80	55
MID		65		-45	45	60		-50	60	75	65
IWP		75		-25	50	50		-30	60	75	55
CL		55		-35	40	55		-35	45	75	60
EOP	1250+80	65	1257+60	-45	45	45	1265+80	-45	55	75	45
OWP		75		-25	45	45		-40	55	80	45
MID		55		-45	50	40		-55	60	75	50
IWP		75		-25	50	45		-35	60	70	50
CL		50		-40	45	45		-50	55	70	50
AVG		69*		-39	49*	53		-43	56*	81	52
MIN		50		-20	30	40		-20	45	65	45
MAX		85		-55	65	65		-65	75	90	65
DEV		9		10	7	6		9	7	6	4

* Note: Outside specification thickness (Spec. H) limits of total design thickness +/- 8 mm.

Table 13(Cont.). Layer Thicknesses from Rod and Level Elevations

	230508					230509				230559		
	Spec. H	38 mm	38 mm	76 mm	51 mm	Spec. H	38 mm	38 mm	51 mm	Spec. H	19 mm	32 mm
Location	Station	MILL	BMR	BIND	SURF	Station	MILL	BMR	SURF	Station	BASE	SURF
EOP	1267+60	-45	50	75	50	1275+80	-50	35	45	1282+80	10	40
OWP		-15	40	90	50		-35	40	50		15	50
MID		-45	55	80	50		-45	50	45		20	50
IWP		-15	45	80	50		-35	55	55		45	50
CL		-45	55	70	55		-40	40	60		35	55
EOP	1268+10	-30	50	75	45	1276+30	-45	40	50	1283+30	25	40
OWP		-30	55	75	45		-35	45	55		45	45
MID		-45	55	75	50		-55	55	50		50	45
IWP		-30	60	70	50		-30	50	55		50	50
CL		-45	55	75	50		-40	40	60		40	55
EOP	1268+60	-40	55	65	45	1276+80	-45	45	50	1283+80	25	40
OWP		-25	50	75	45		-30	45	55		40	45
MID		-45	55	65	55		-45	45	60		45	35
IWP		-25	55	70	45		-20	45	55		50	45
CL		-45	50	70	50		-50	50	55		35	50
EOP	1269+10	-45	55	75	40	1277+30	-30	30	55	1284+30	25	30
OWP		-40	55	70	45		-20	35	55		40	35
MID		-50	60	70	45		-25	40	55		35	35
IWP		-30	55	70	45		-20	45	50		50	40
CL		-45	50	70	45		-30	35	60		35	45
EOP	1269+60	-30	55	75	40	1277+80	-40	35	45	1284+80	30	30
OWP		-20	55	75	45		-30	40	45		35	40
MID		-35	55	75	50		-45	50	45		35	40
IWP		-30	55	75	50		-25	45	45		45	45
CL		-40	45	70	50		-35	35	55		35	45
EOP	1270+10	-20	45	80	40	1278+30	-40	45	50	1285+30	25	30
OWP		-10	45	80	40		-25	45	45		35	35
MID		-40	55	65	55		-40	45	50		30	40
IWP		-20	55	75	45		-25	50	50		40	45
CL		-40	50	75	45		-40	45	55		25	50
EOP	1270+60	-25	50	70	35	1278+80	-30	55	35	1285+80	25	35
OWP		-15	50	70	45		-20	45	50		35	35
MID		-35	50	70	45		-30	45	45		25	45
IWP		-20	50	70	50		-20	45	50		40	45
CL		-35	45	65	50		-30	35	50		25	50
EOP	1271+10	-25	50	70	35	1279+30	-30	40	45	1286+30	10	45
OWP		-15	45	* 75	40		-20	40	50		30	40
MID		-40	50	75	45		-35	45	50		25	45
IWP		-25	55	70	45		-25	50	45		35	45
CL		-45	50	70	45		-30	35	45		25	60
EOP	1271+60	-35	50	80	40	1279+80	-35	35	50	1286+80	20	45
OWP		-25	50	75	45		-25	40	50		30	50
MID		-40	50	70	55		-45	45	55		25	50
IWP		-25	50	75	50		-25	45	50		40	50
CL		-35	45	60	60		-40	35	55		25	55
EOP	1272+10	-20	45	65	50	1280+30	-35	35	45	1287+30	25	45
OWP		-15	45	75	45		-30	45	50		35	50
MID		-35	50	75	50		-40	45	55		25	55
IWP		-25	60	65	55		-25	50	50		40	50
CL		-40	45	70	55		-35	40	55		30	50
EOP	1272+60	-20	50	70	40	1280+80	-45	40	50	1287+80	15	40
OWP		-15	45	80	40		-35	40	55		30	45
MID		-35	55	70	50		-45	40	60		20	50
IWP		-25	55	70	50		-30	45	55		35	50
CL		-40	50	70	50		-40	35	65		25	50
AVG		-31	51*	72	47		-34	43	51		32*	45*
MIN		-10	40	60	35		-20	30	35		10	30
MAX		-50	60	90	60		-55	55	65		50	60
DEV		11	4	5	5		9	6	5		10	7

* Note: Outside specification thickness (Spec. H) limits of total design thickness +/- 8 mm.

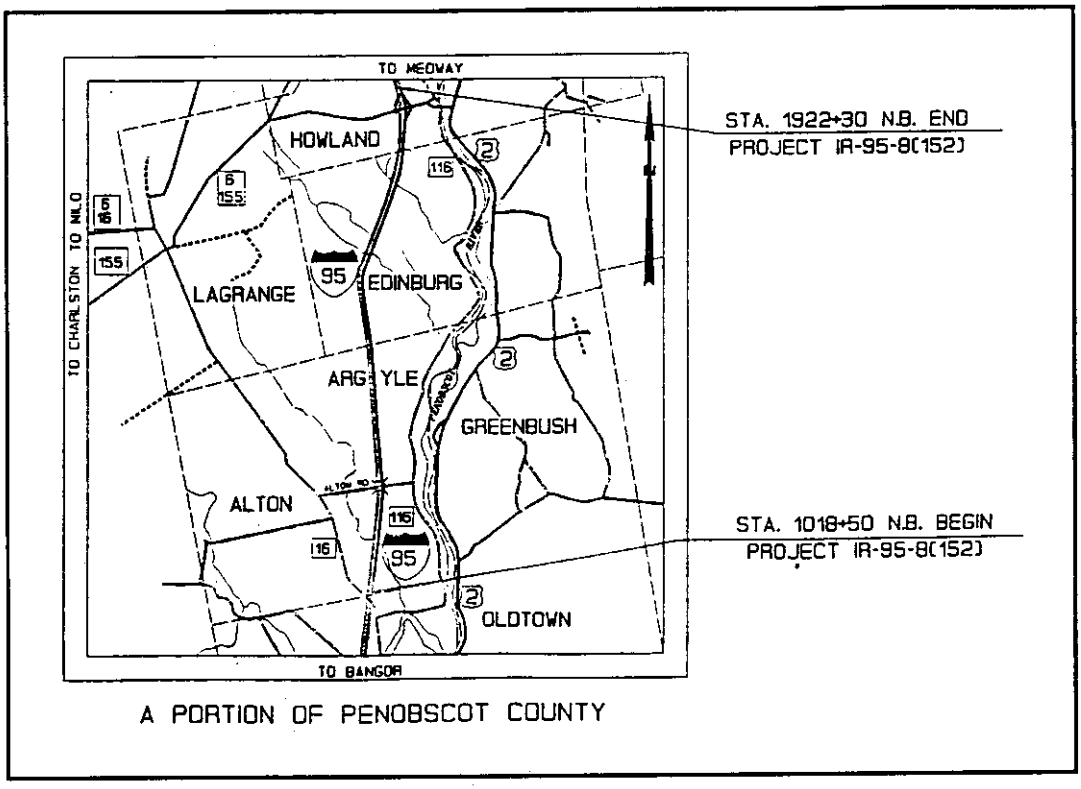
Table 14. IRI Values from the Profilometer Survey, Before and After Construction

	Before Construction		After Construction	
Section ID	Date Surveyed yy/mm/dd	Average IRI of 5 Runs m/km	Date Surveyed yy/mm/dd	Average IRI of 5 Runs m/km
230501	95/04/21	1.212	95/08/15	1.271
230502	95/04/21	1.024	95/08/15	0.773
230503	95/04/21	1.213	95/08/15	0.945
230504	95/04/21	1.366	95/08/15	0.860
230505	95/04/20	1.272	95/08/15	0.699
230506	95/04/20	1.158	95/08/15	0.757
230507	95/04/21	1.434	95/08/15	0.854
230508	95/04/20	1.236	95/08/15	0.812
230509	95/04/20	1.097	95/08/15	1.036
230559	95/04/20	0.759	95/08/15	0.805

Table 15. Rut Depth from the Dipstick Survey, Before and After Construction

	Before Construction April 24-25-26, 1995		After Construction October 03-04-05, 1995	
Section ID	LWP Avg Rut Depth (mm) Offset of 11 Readings (R) (m)	RWP Avg Rut Depth (mm) Offset of 11 Readings (R) (m)	LWP Avg Rut Depth (mm) Offset of 11 Readings (R) (m)	RWP Avg Rut Depth (mm) Offset of 11 Readings (R) (m)
230501	13.7 mm 2.743 m - 11 R	12.1 mm 0.914 m - 09 R 1.219 m - 02 R	13.3 mm 2.743 m - 05 R 3.048 m - 06 R	12.4 mm 1.219 m - 11 R
230502	13.1 mm* 2.743 m - 09 R 2.438 m - 02 R	12.6 mm 0.914 m - 11 R	1.7 mm 2.743 m - 11 R	2.1 mm 0.914 m - 09 R 0.305 m - 02 R
230503	13.0 mm* 2.743 m - 10 R 2.438 m - 01 R	13.0 mm* 0.914 m - 07 R 1.219 m - 04 R	1.7 mm 2.743 m - 08 R 2.438 m - 03 R	1.2 mm 0.914 m - 11 R
230504	14.0 mm* 2.743 m - 10 R 2.438 m - 01 R	14.9 mm* 0.914 m - 06 R 1.219 m - 05 R	1.9 mm 2.743 m - 11 R	1.5 mm 0.914 m - 11 R
230505	13.1 mm* 2.743 m - 11 R	14.1 mm* 0.914 m - 11 R	1.9 mm 2.743 m - 09 R 1.829 m - 01 R 3.048 m - 01 R	0.9 mm 0.914 m - 11 R
230506	15.5 mm 2.743 m - 10 R 2.438 m - 01 R	16.0 mm 0.914 m - 11 R	2.6 mm 2.743 m - 11 R	2.4 mm 0.914 m - 11 R
230507	14.7 mm 2.743 m - 08 R 2.438 m - 03 R	11.0 mm 0.914 m - 11 R	2.6 mm 2.743 m - 08 R 2.438 m - 03 R	2.5 mm 0.914 m - 11 R
230508	17.4 mm 2.743 m - 09 R 2.438 m - 02 R	12.9 mm 0.914 m - 11 R	1.7 mm 2.743 m - 07 R 2.438 m - 02 R 1.829 m - 02 R	2.3 mm 0.914 m - 11 R
230509	16.5 mm 2.743 m - 10 R 2.438 m - 01 R	13.0 mm 0.914 m - 10 R 1.524 m - 01 R	1.7 mm 2.743 m - 04 R 2.438 m - 02 R 1.829 m - 05 R	1.9 mm 0.914 m - 11 R
230559	11.2 mm 2.743 m - 09 R 2.438 m - 01 R 3.048 m - 01 R	11.1 mm 0.914 m - 07 R 1.219 m - 04 R	1.3 mm 2.743 m - 11 R	0.8 mm 0.914 m - 09 R 0.610 m - 01 R 1.524 m - 01 R

* Note: The Construction Guidelines require a leveling course be placed in ruts greater than 12.7 mm prior to overlay of the minimal preparation sections (not performed in this project).



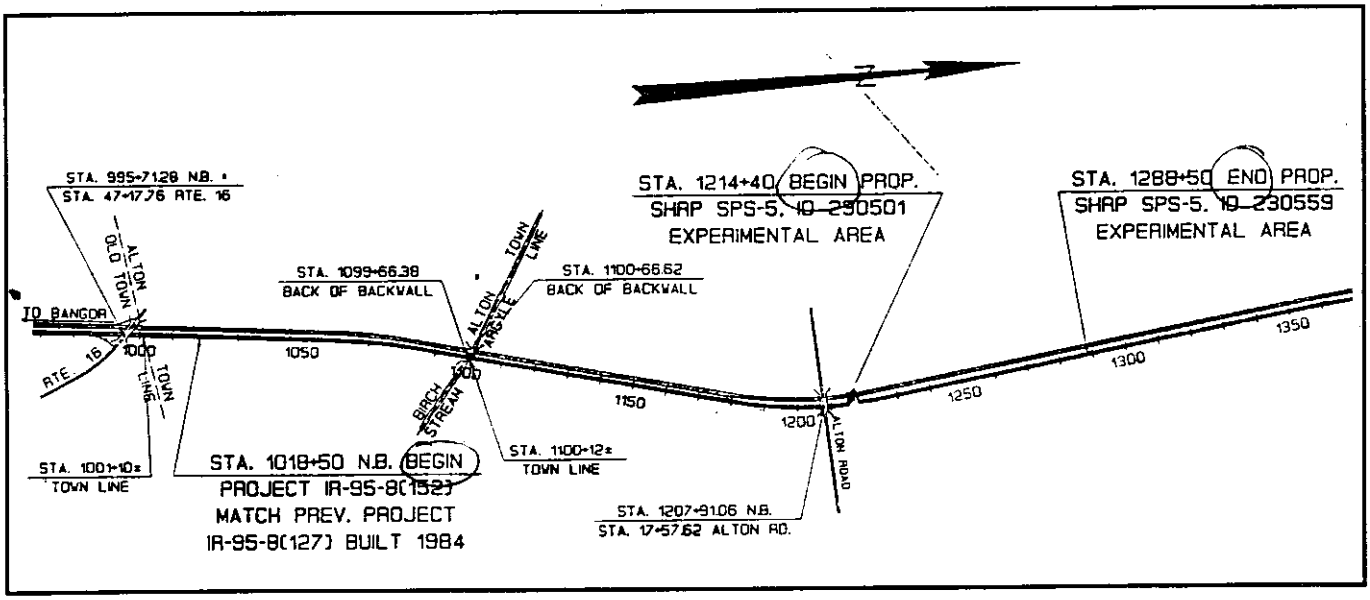


Figure 1. Site Location Maps - SPS Project 230500

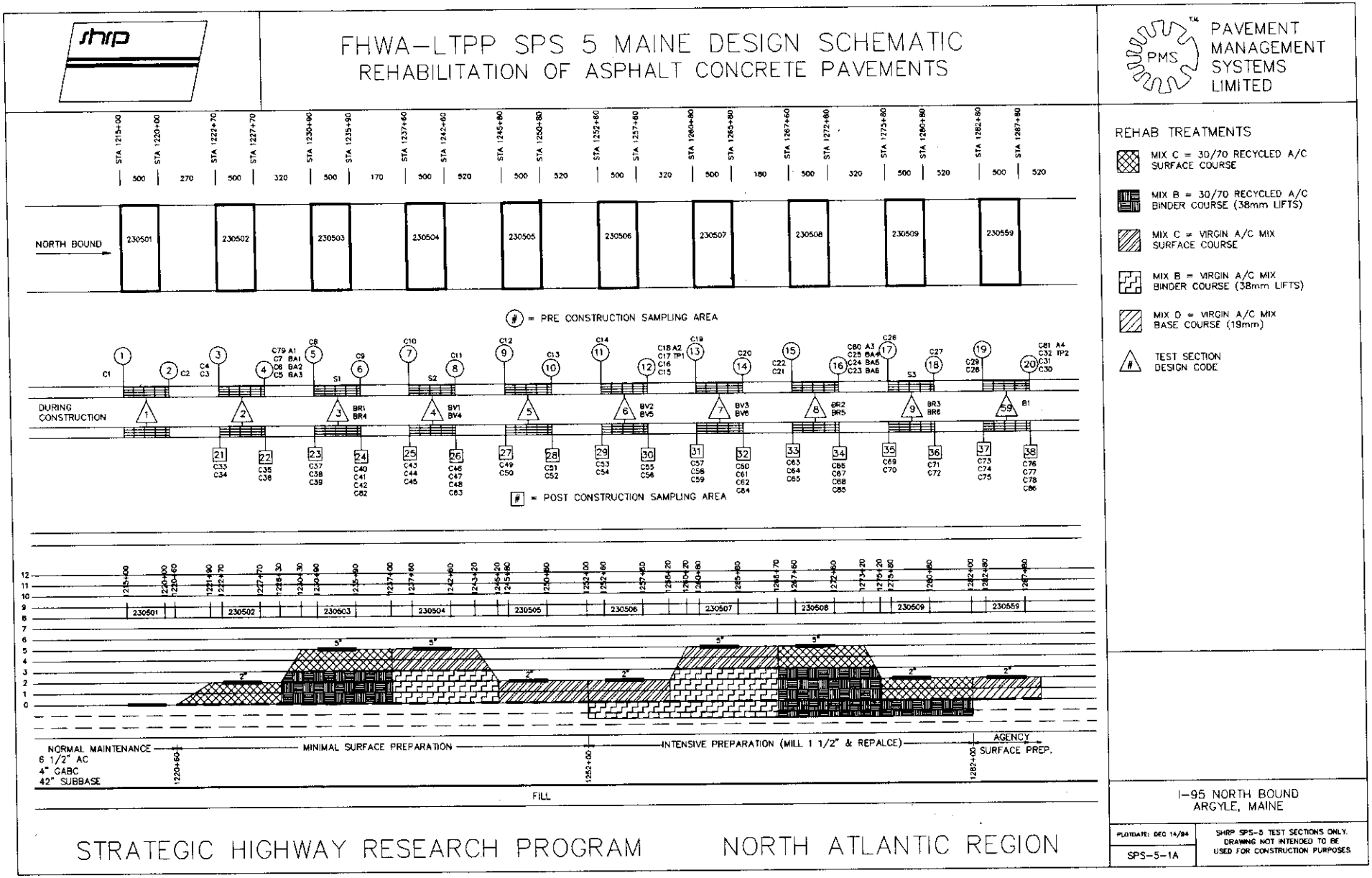
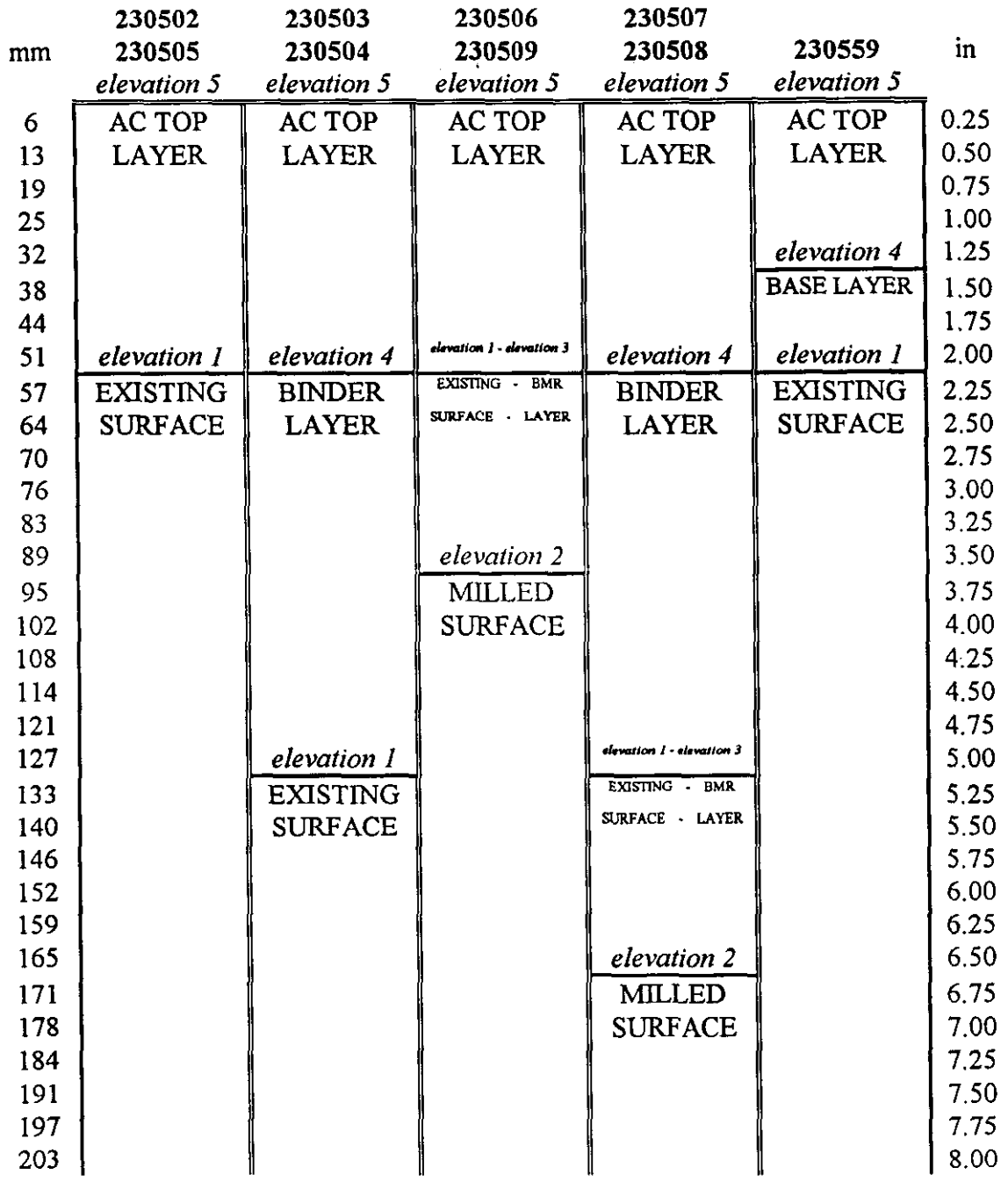


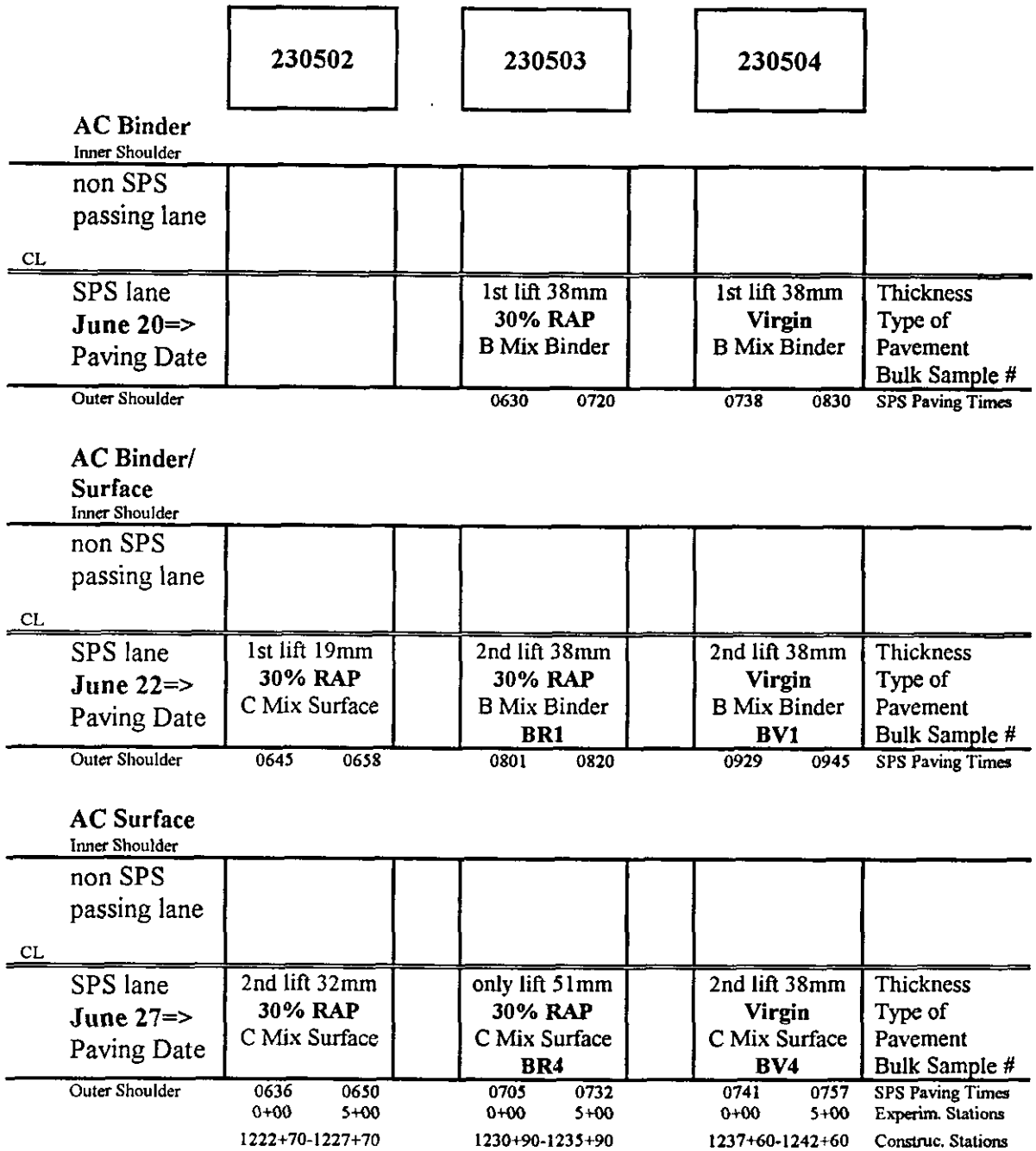
FIGURE 2 - FIELD MATERIALS SAMPLING AND TESTING PLAN



Note: Refer to Table 5 for the dates of the five stages of elevation measurements.

First stage	elevation 1	Existing Surface	June 1, 1995
Second stage	elevation 2	Milled Surface	June 19, 1995
Third stage	elevation 3	Binder Mill Replacement BMR Layer	June 20, 1995
Fourth stage	elevation 4	Base or Binder Layer	June 20-22, 1995
Fifth stage	elevation 5	AC Top Layer	June 27, 1995

Figure 3. Pavement Structures and the Five Stages of Rod and Level Elevations



Not to scale

CL - Center Line
BR# & BV# - AC Bulk Samples collected from Paver Hopper while at Station (2+50)

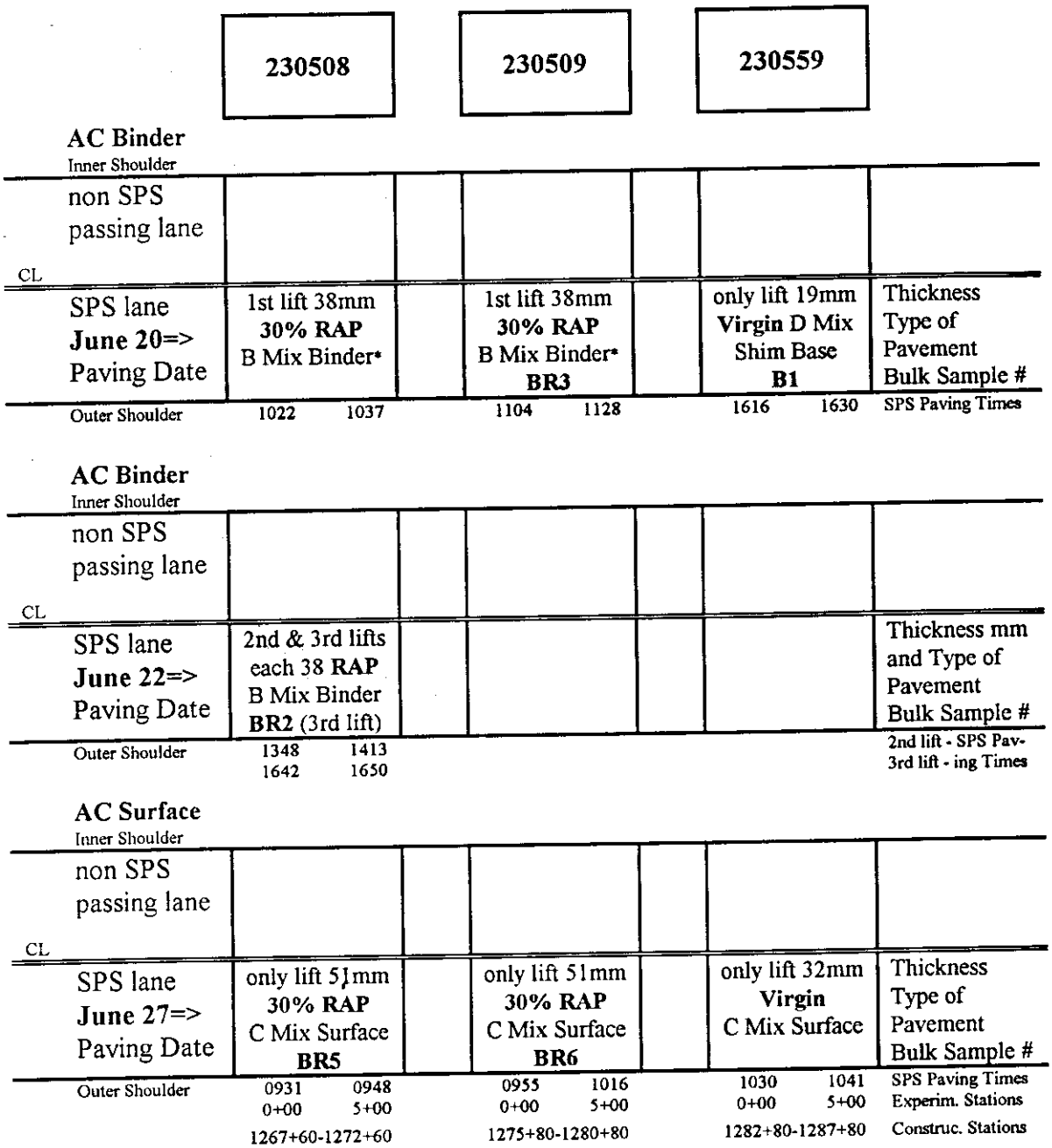
Figure 4. Paving Dates, Times, and Bulk Sample Locations

	230505		230506		230507	
AC Binder Inner Shoulder						
non SPS passing lane CL						
SPS lane **June 20=>** Paving Date			1st lift 38mm **Virgin** B Mix Binder* **BV2**		1st lift 38mm **Virgin** B Mix Binder*	Thickness Type of Pavement Bulk Sample #
Outer Shoulder			0850 0920		0933 0958	SPS Paving Times
AC Binder/ Surface Inner Shoulder						
non SPS passing lane CL						
SPS lane **June 22=>** Paving Date	1st lift 19mm **Virgin** C Mix Surface				2nd & 3rd lifts each 38**Virgin** B Mix Binder **BV3** (3rd lift)	Thickness mm and Type of Pavement Bulk Sample #
Outer Shoulder	1100 1111				1224 1238 1525 1538	2nd lift - SPS Pav- 3rd lift - ing Times
AC Surface Inner Shoulder						
non SPS passing lane CL						
SPS lane **June 27=>** Paving Date	2nd lift 32mm **Virgin** C Mix Surface		only lift 51mm **Virgin** C Mix Surface **BV5**		only lift 51mm **Virgin** C Mix Surface **BV6**	Thickness Type of Pavement Bulk Sample #
Outer Shoulder	0810 0822 0+00 5+00 1245+80-1250+80		0827 0840 0+00 5+00 1252+60-1257+60		0848 0917 0+00 5+00 1260+80-1265+80	SPS Paving Times Experim. Stations Construc. Stations

Not to scale

CL - Center Line
BR# & BV# - AC Bulk Samples collected from Paver Hopper while at Station (2+50)
* This 1st lift of Binder is replacing the milled pavement (Binder Mill Replacement Layer)

Figure 4(Cont.). Paving Dates, Times, and Bulk Sample Locations



Not to scale

CL - Center Line
BR# & BV# &B# - AC Bulk Samples collected from Paver Hopper while at Station (2+50)
* This 1st lift of Binder is replacing the milled pavement (Binder Mill Replacement Layer)

Figure 4(Cont.). Paving Dates, Times, and Bulk Sample Locations

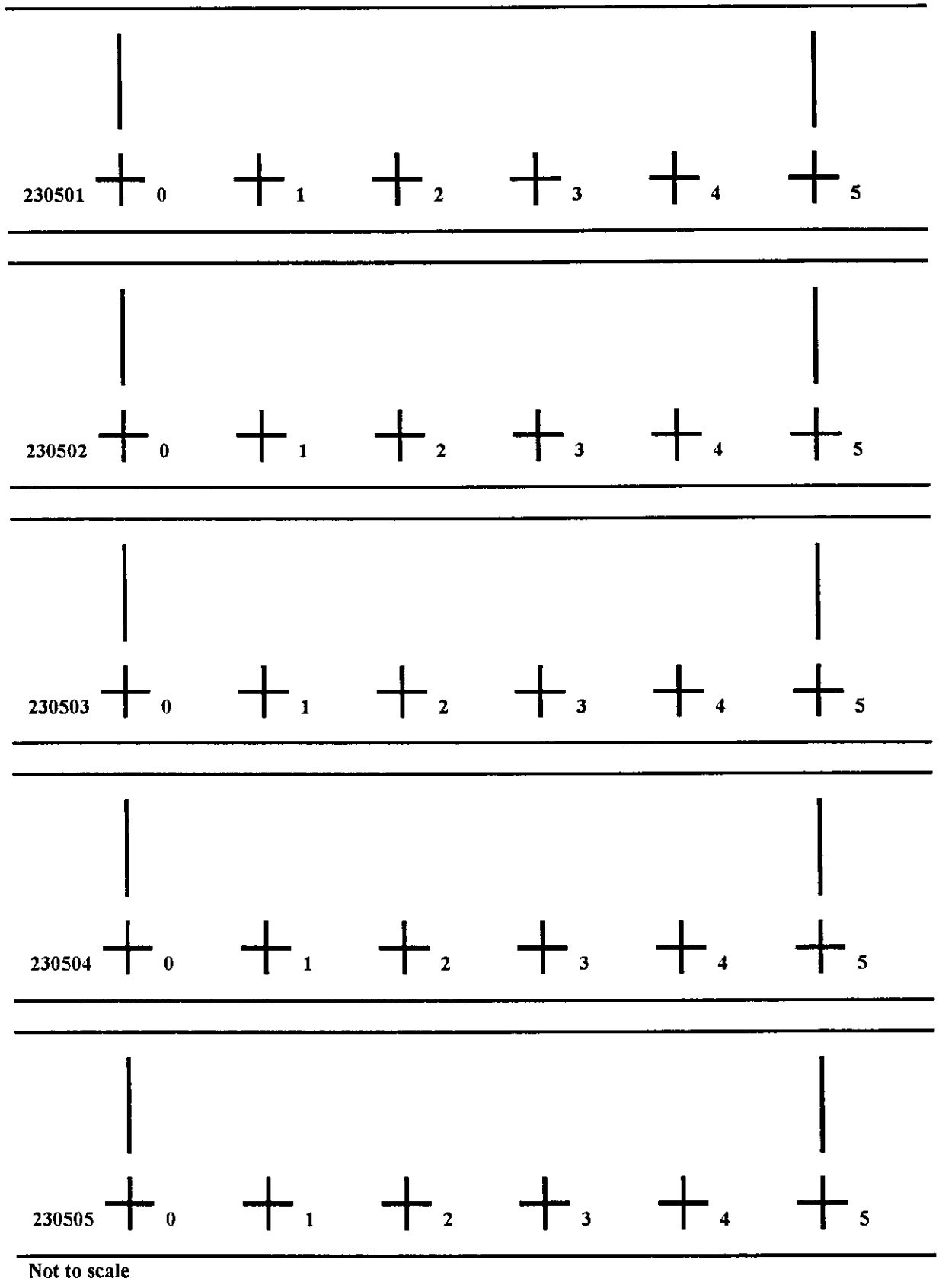


Figure 5. Site Marking Plan, Before and After Construction

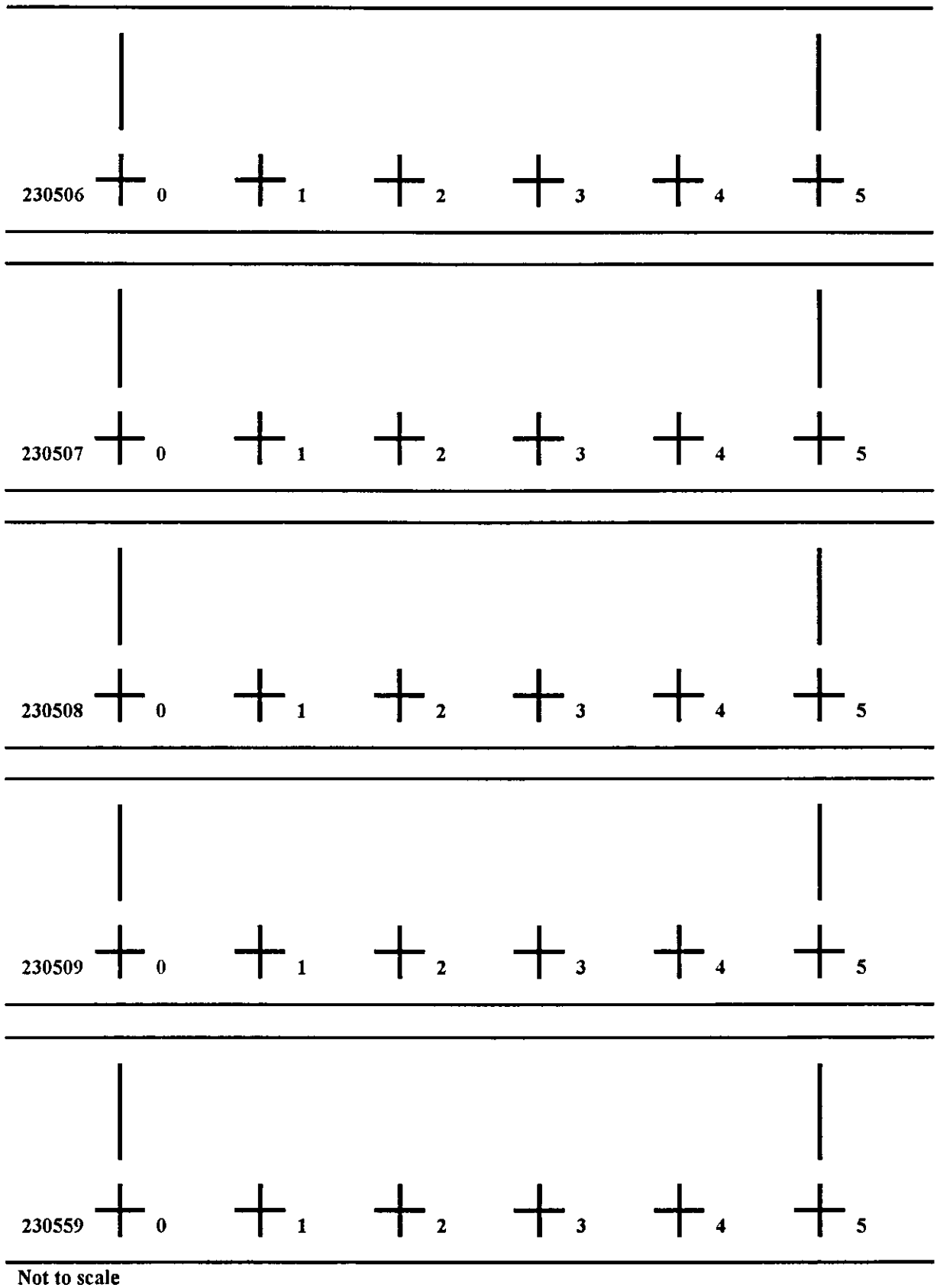


Figure 5(Cont.). Site Marking Plan, Before and After Construction

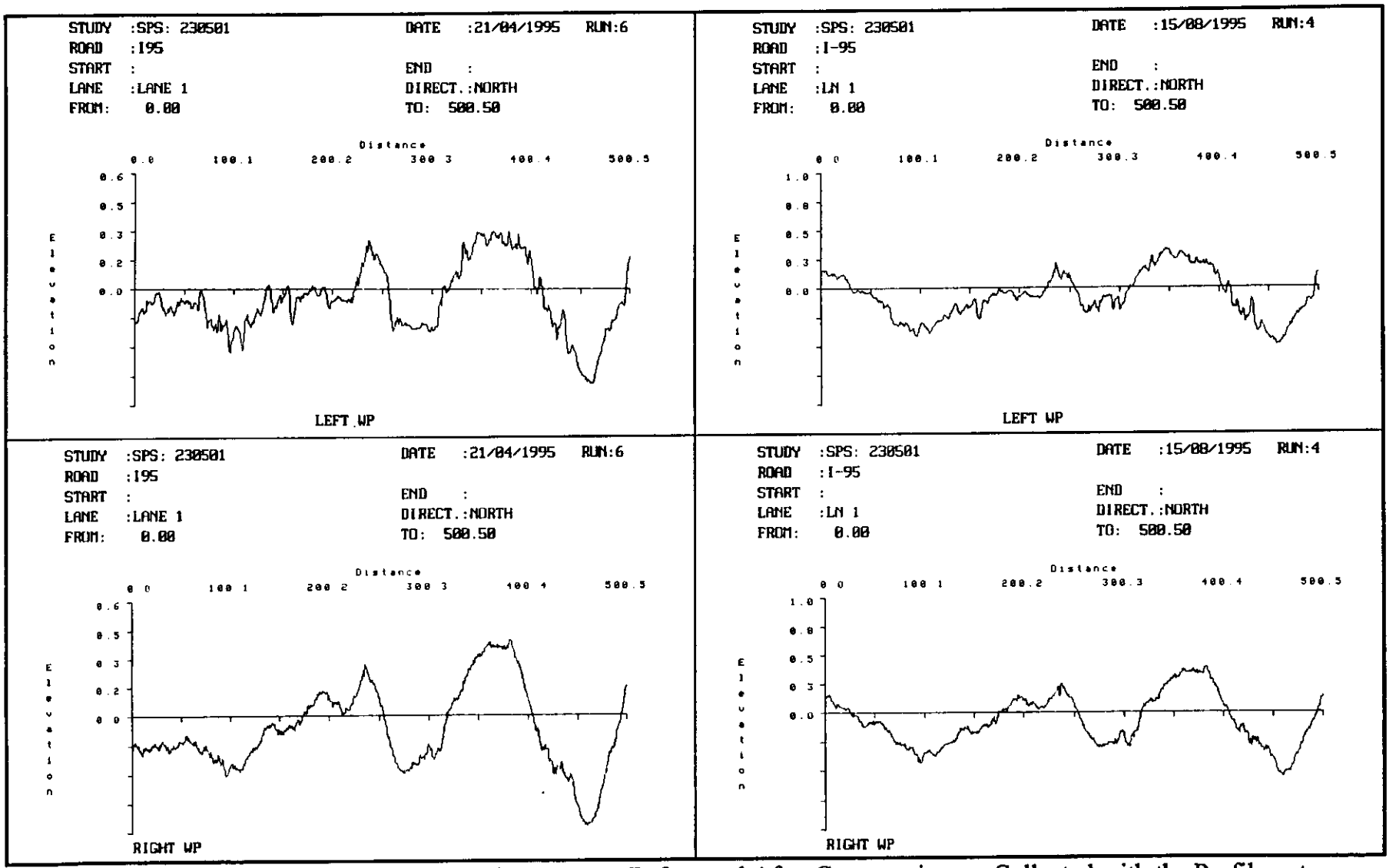


Figure 6. Elevation Measurements, Section 230501, Before and After Construction, as Collected with the Profilometer

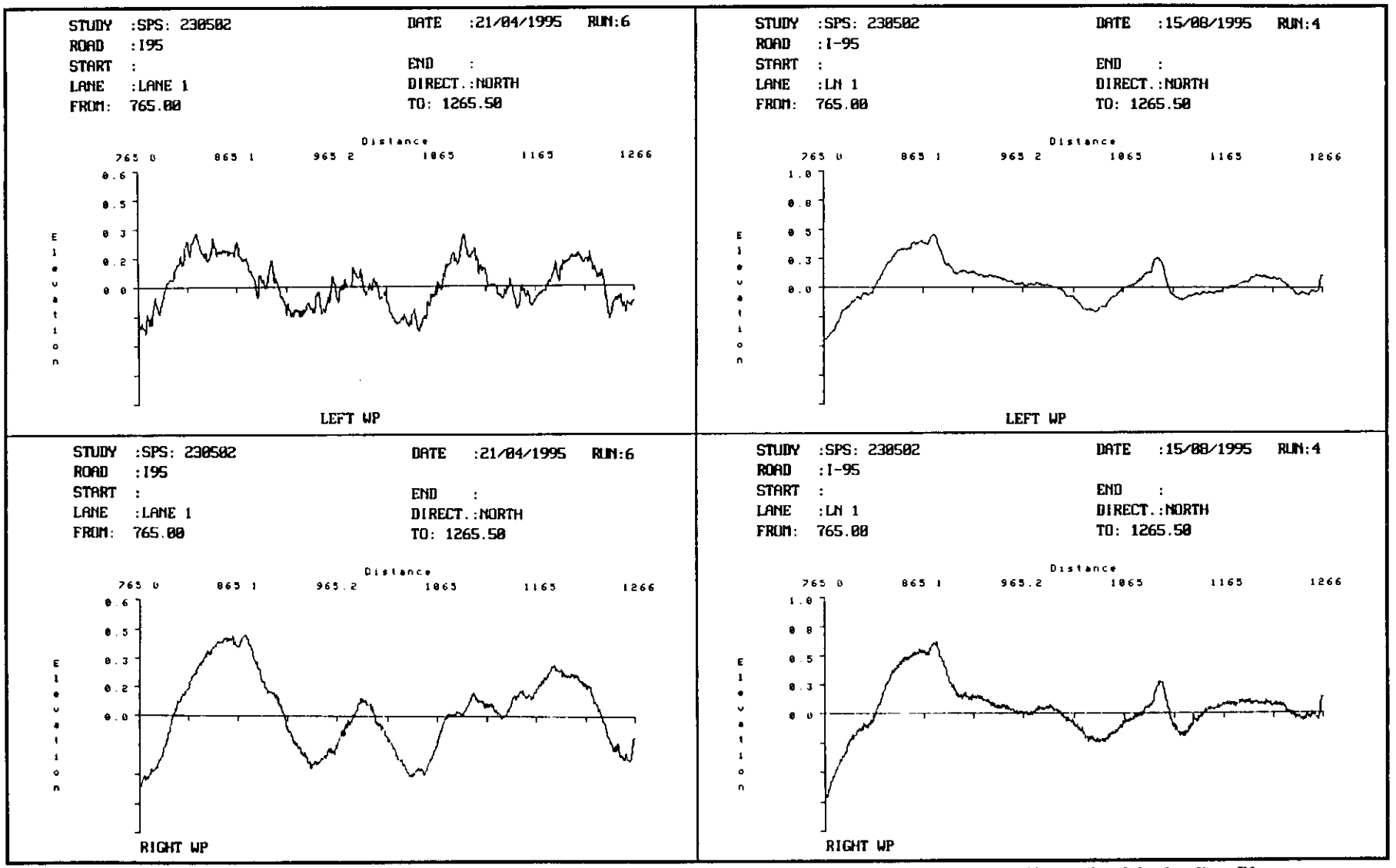


Figure 7. Elevation Measurements, Section 230502, Before and After Construction, as Collected with the Profilometer

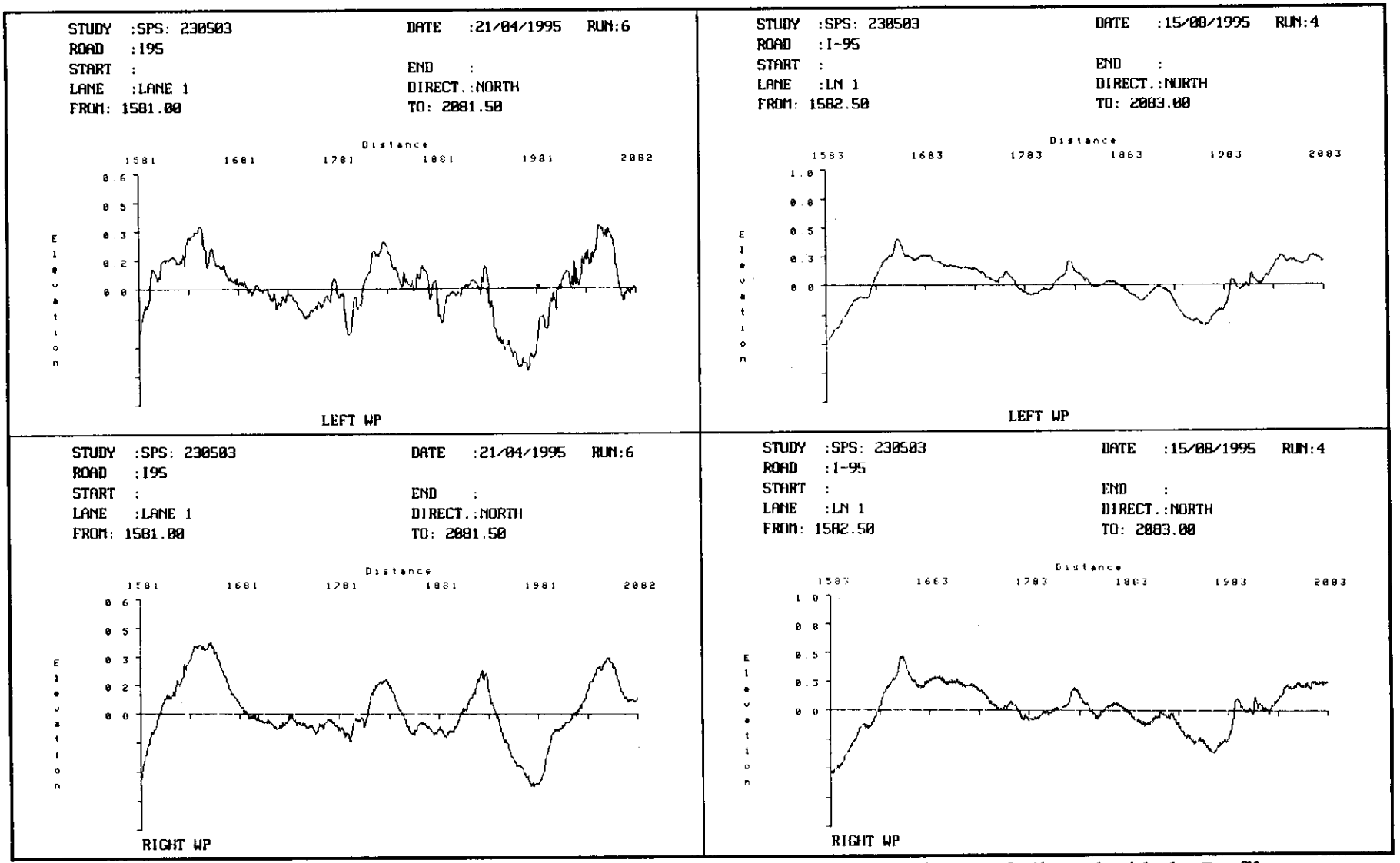


Figure 8. Elevation Measurements, Section 230503, Before and After Construction, as Collected with the Profilometer

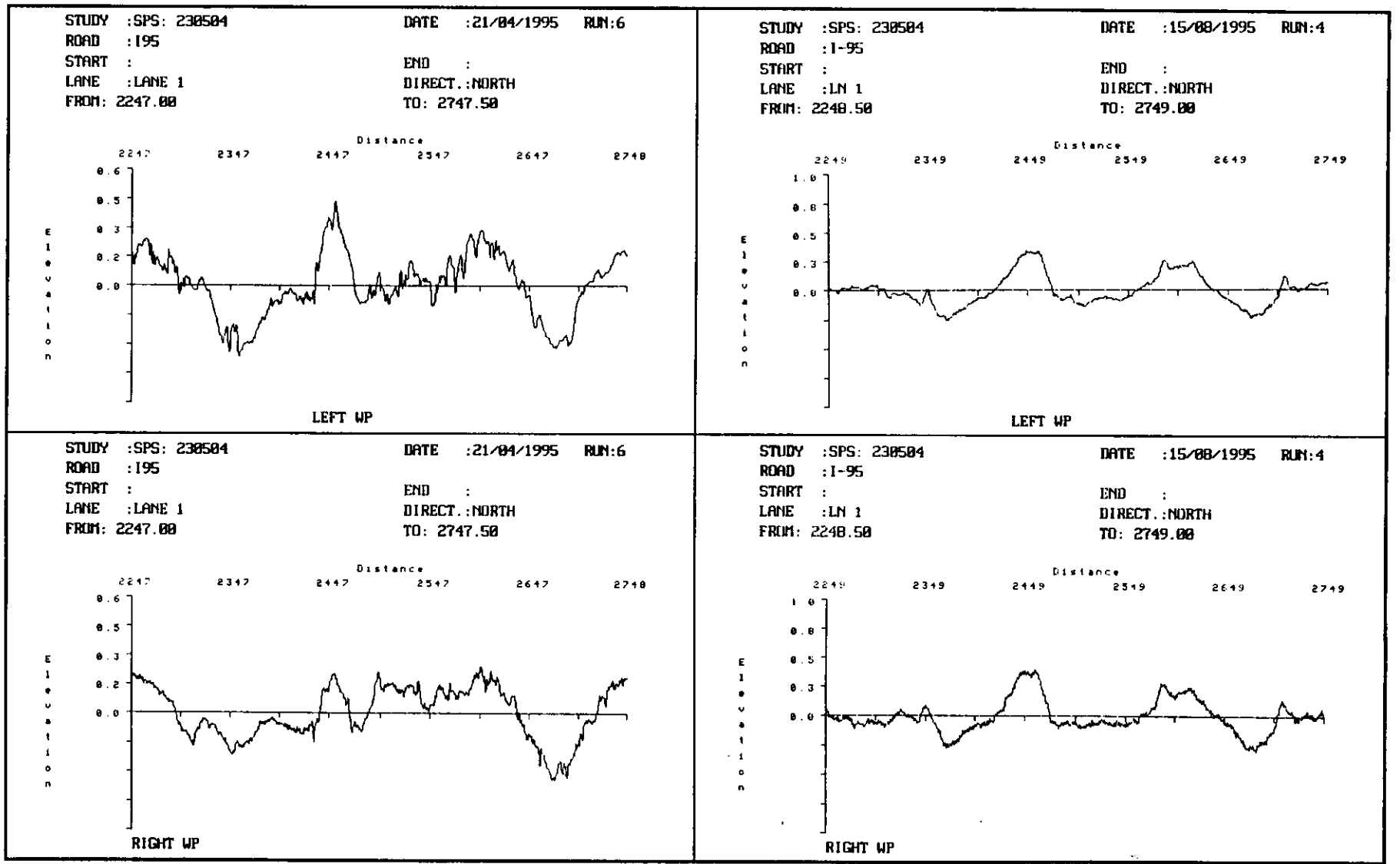


Figure 9. Elevation Measurements, Section 230504, Before and After Construction, as Collected with the Profilometer

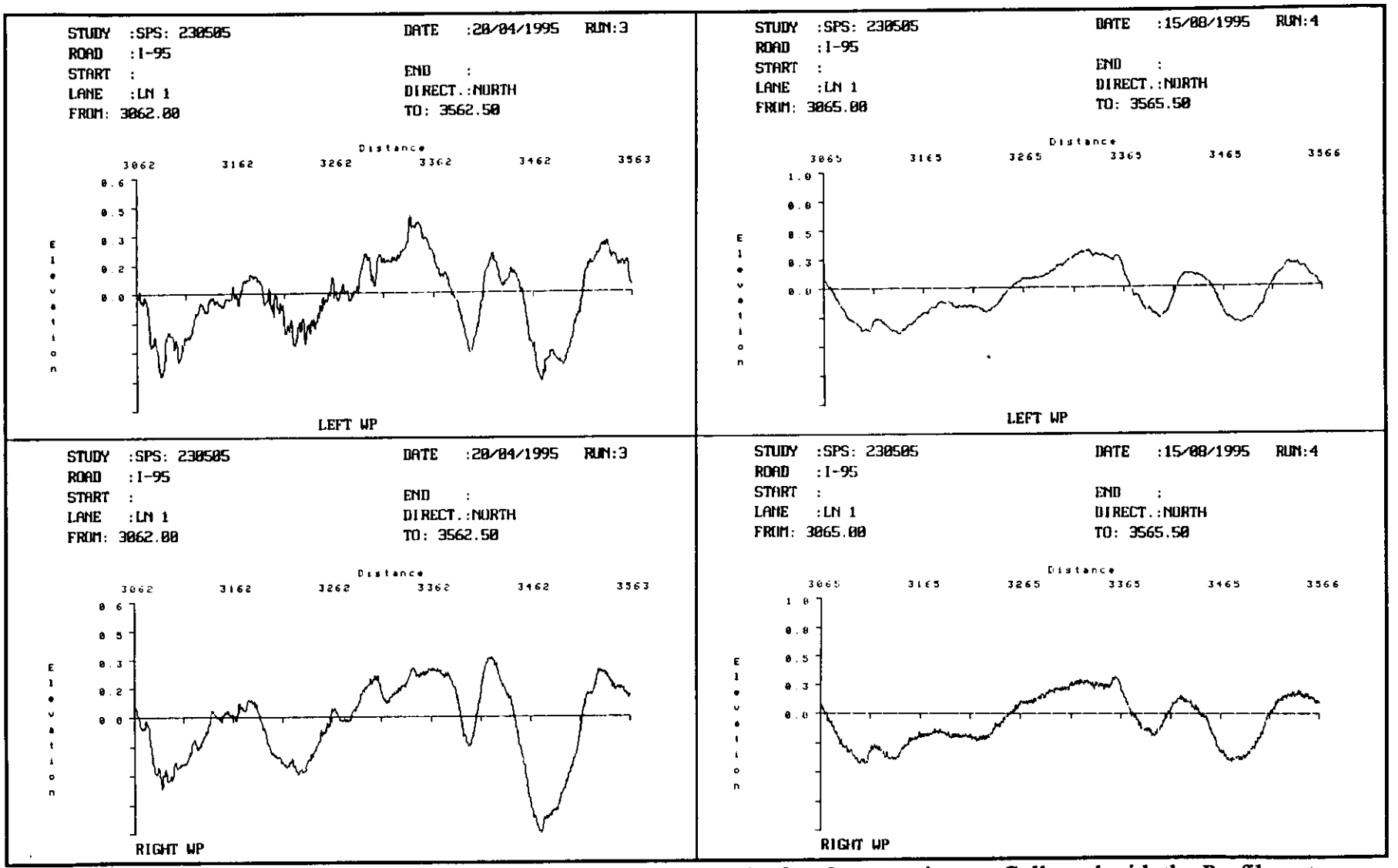


Figure 10. Elevation Measurements, Section 230505, Before and After Construction, as Collected with the Profilometer

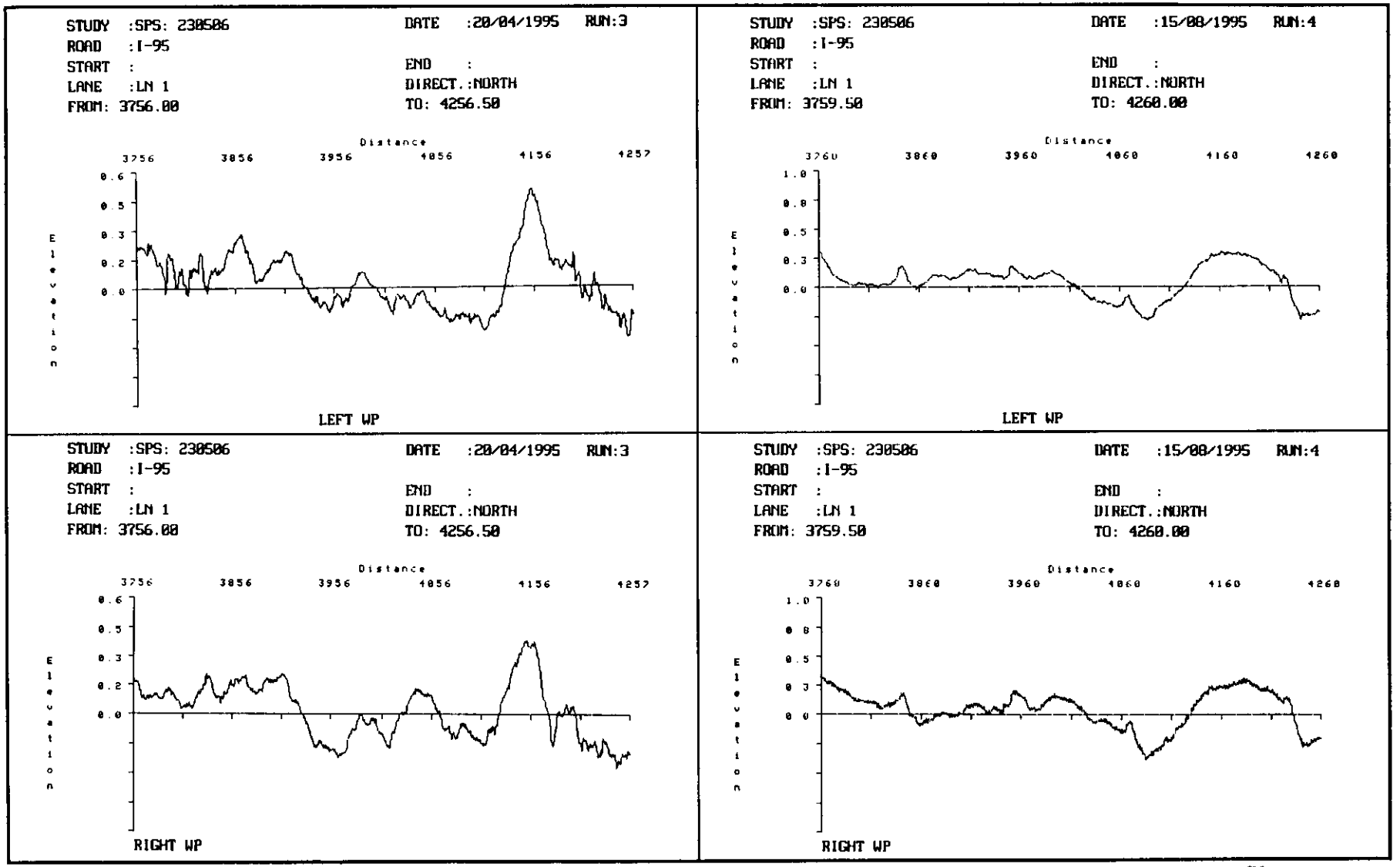


Figure 11. Elevation Measurements, Section 230506, Before and After Construction, as Collected with the Profilometer

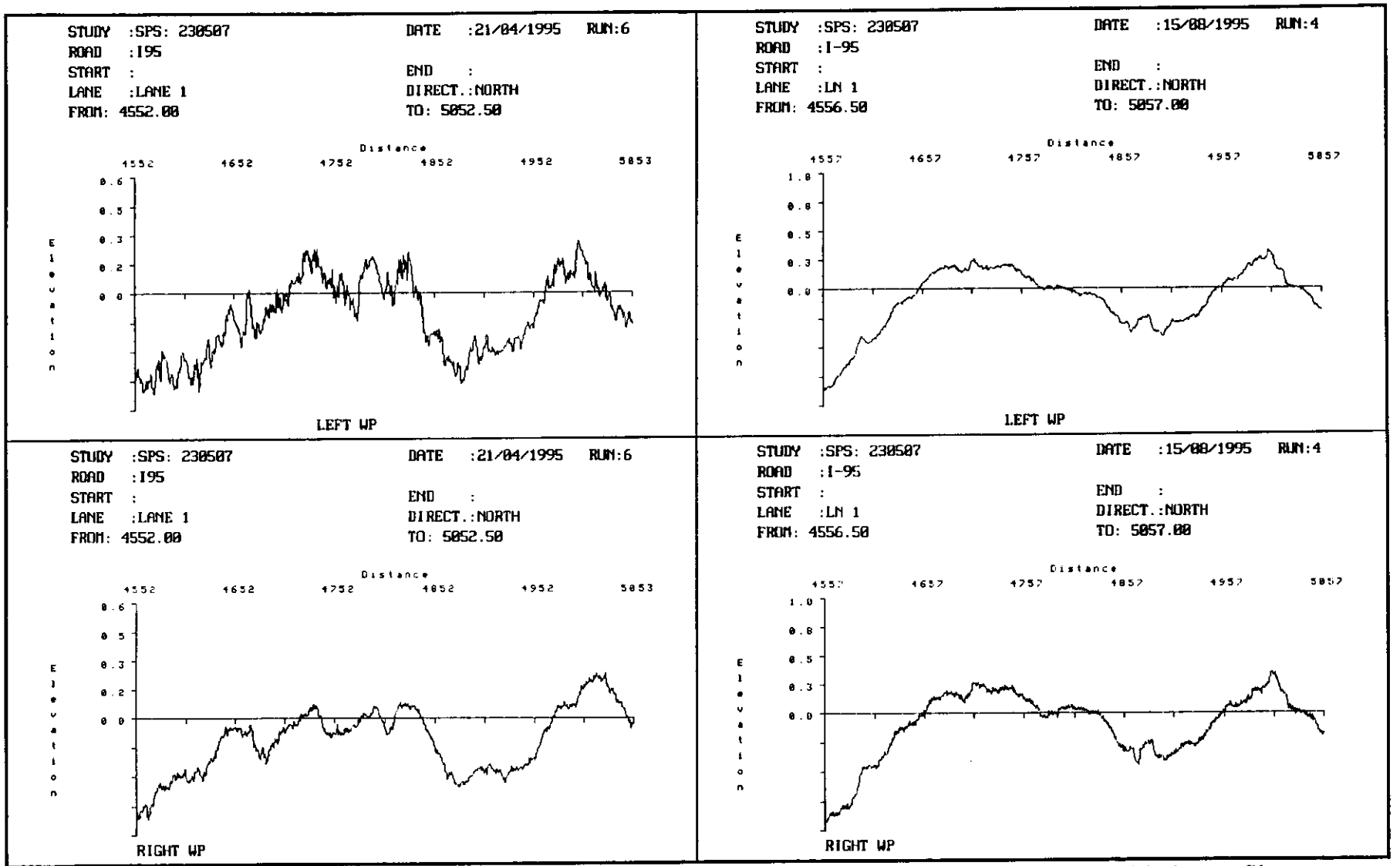


Figure 12. Elevation Measurements, Section 230507, Before and After Construction, as Collected with the Profilometer

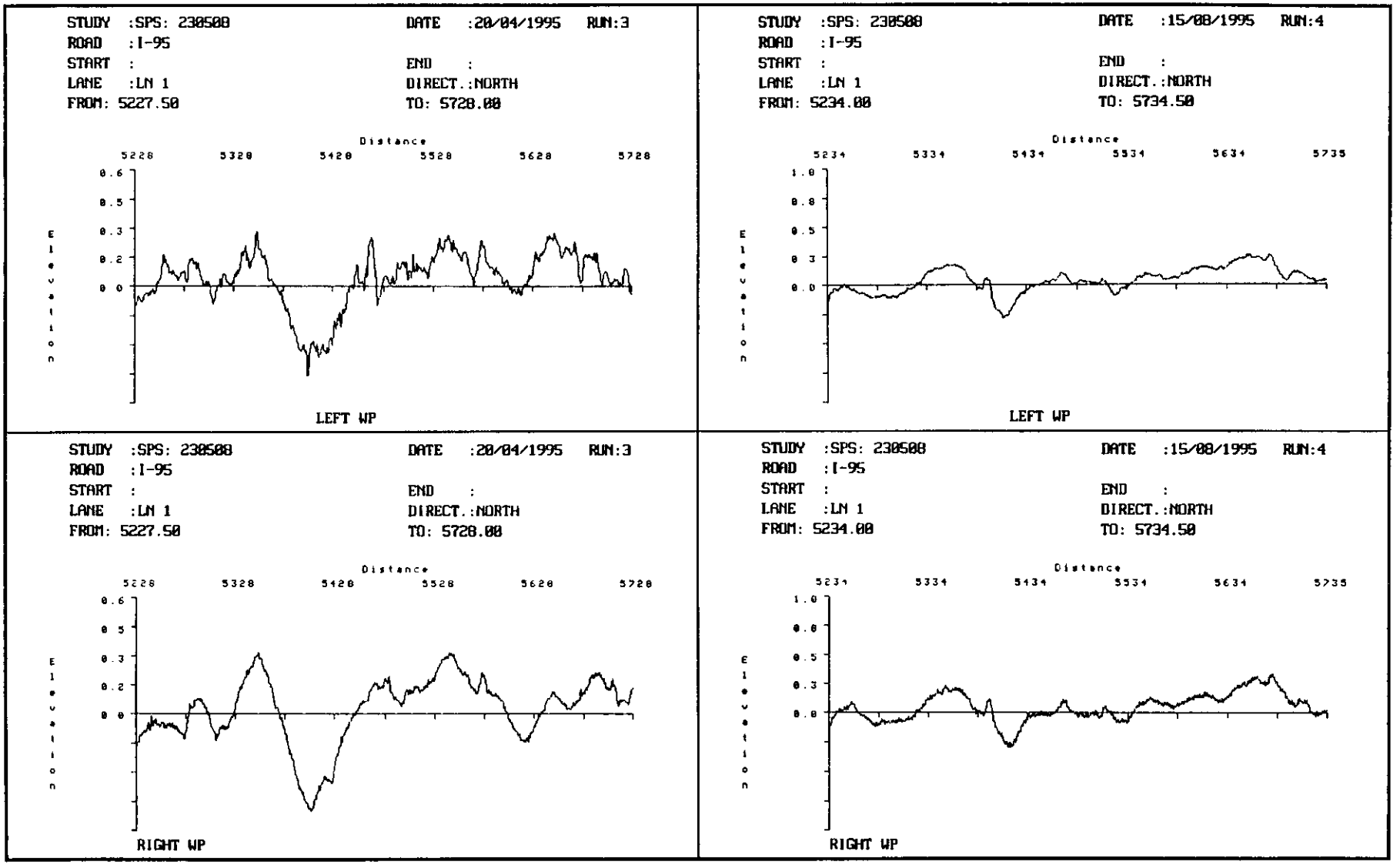


Figure 13. Elevation Measurements, Section 230508, Before and After Construction, as Collected with the Profilometer

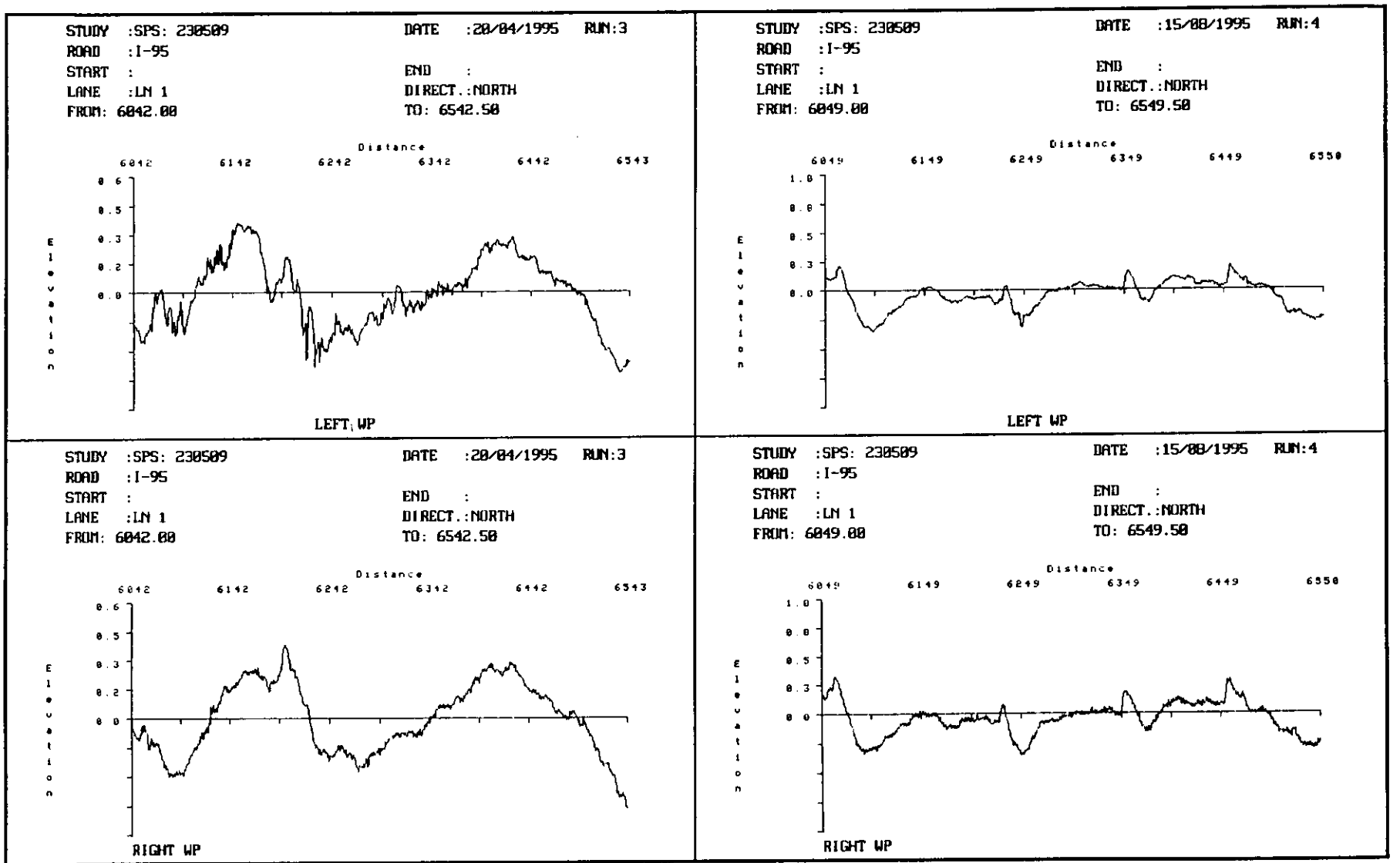


Figure 14. Elevation Measurements, Section 230509, Before and After Construction, as Collected with the Profilometer

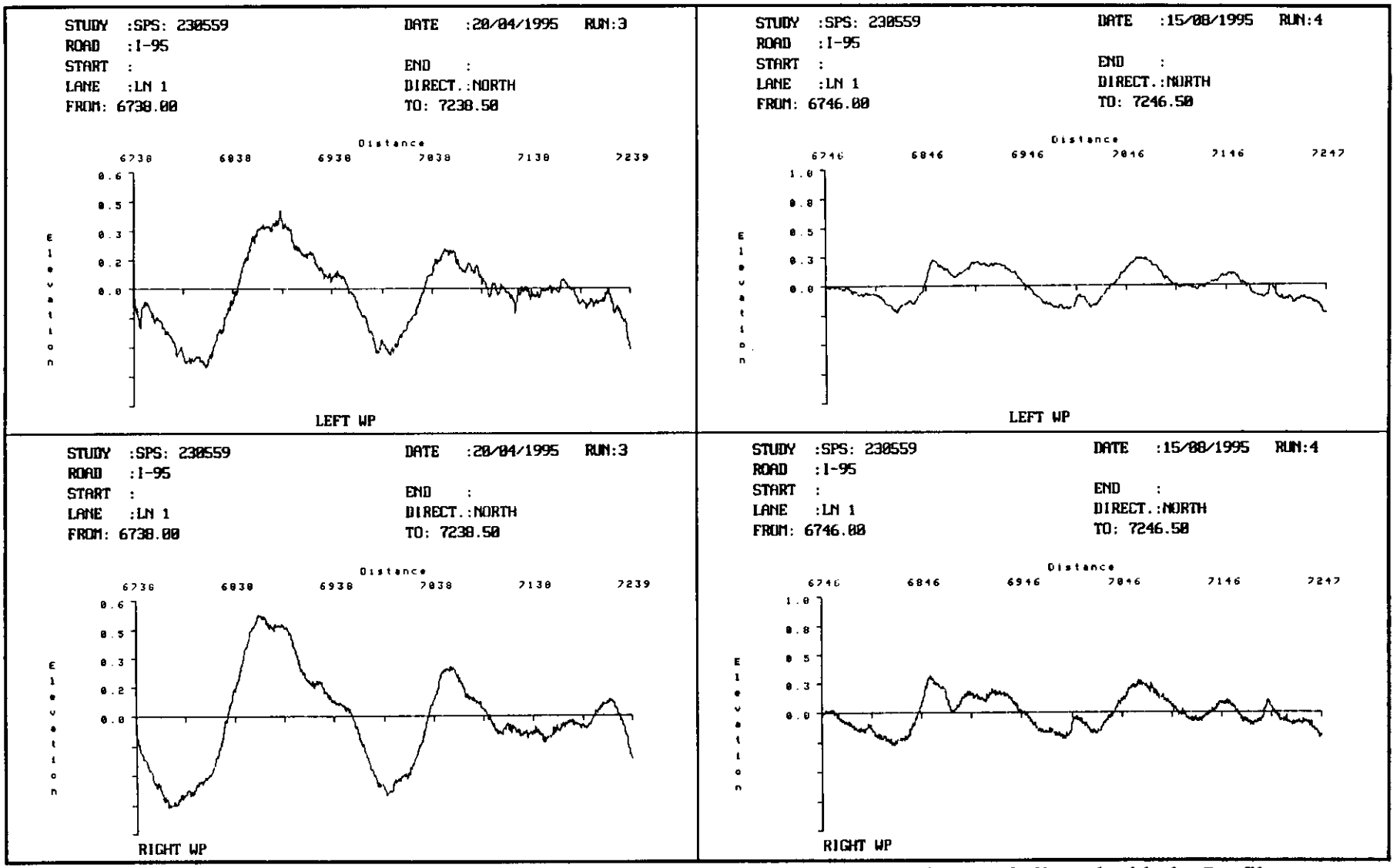


Figure 15. Elevation Measurements, Section 230559, Before and After Construction, as Collected with the Profilometer

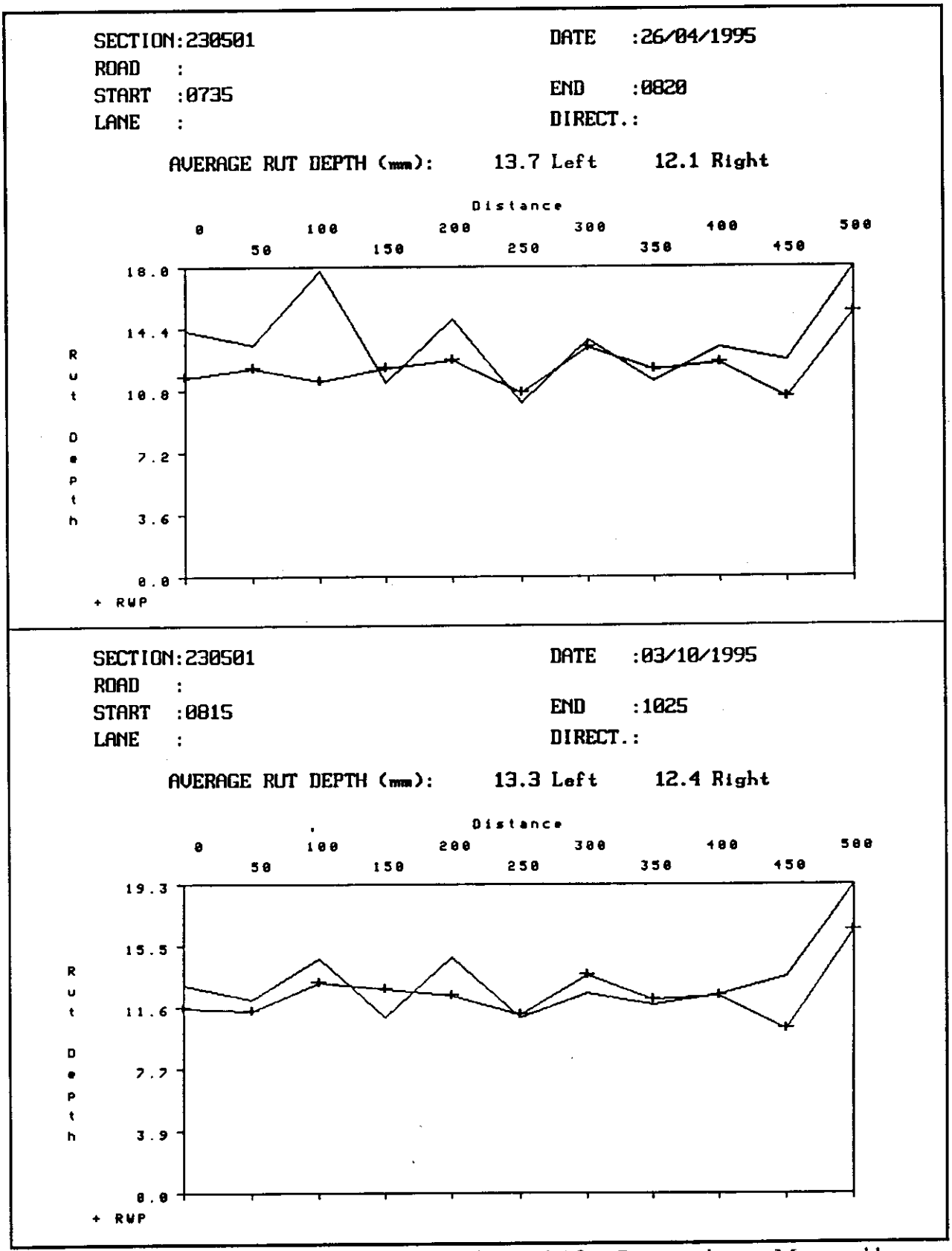


Figure 16. Rut Depth, Section 230501, Before and After Construction, as Measured by the Dipstick

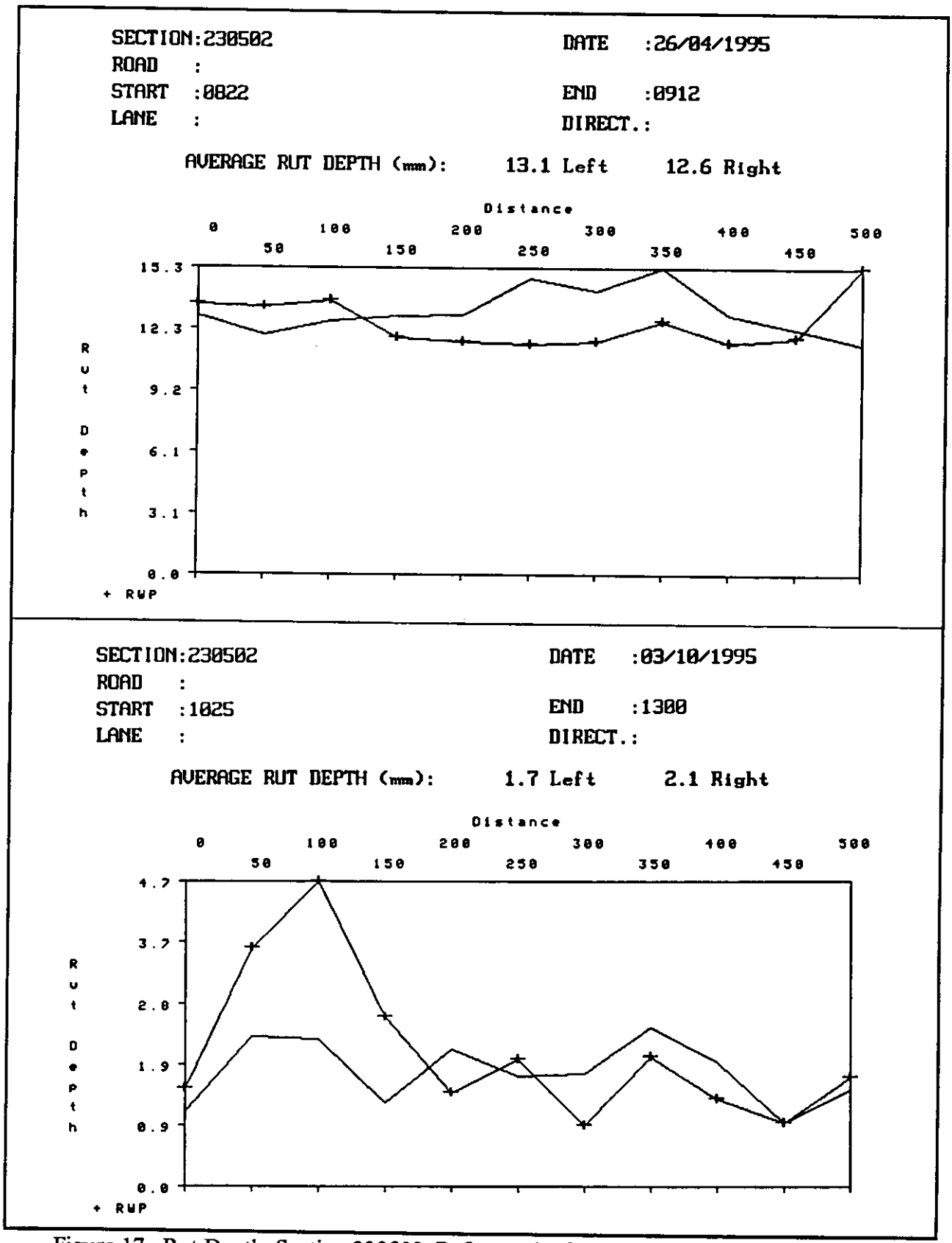


Figure 17. Rut Depth, Section 230502, Before and After Construction, as Measured by the Dipstick

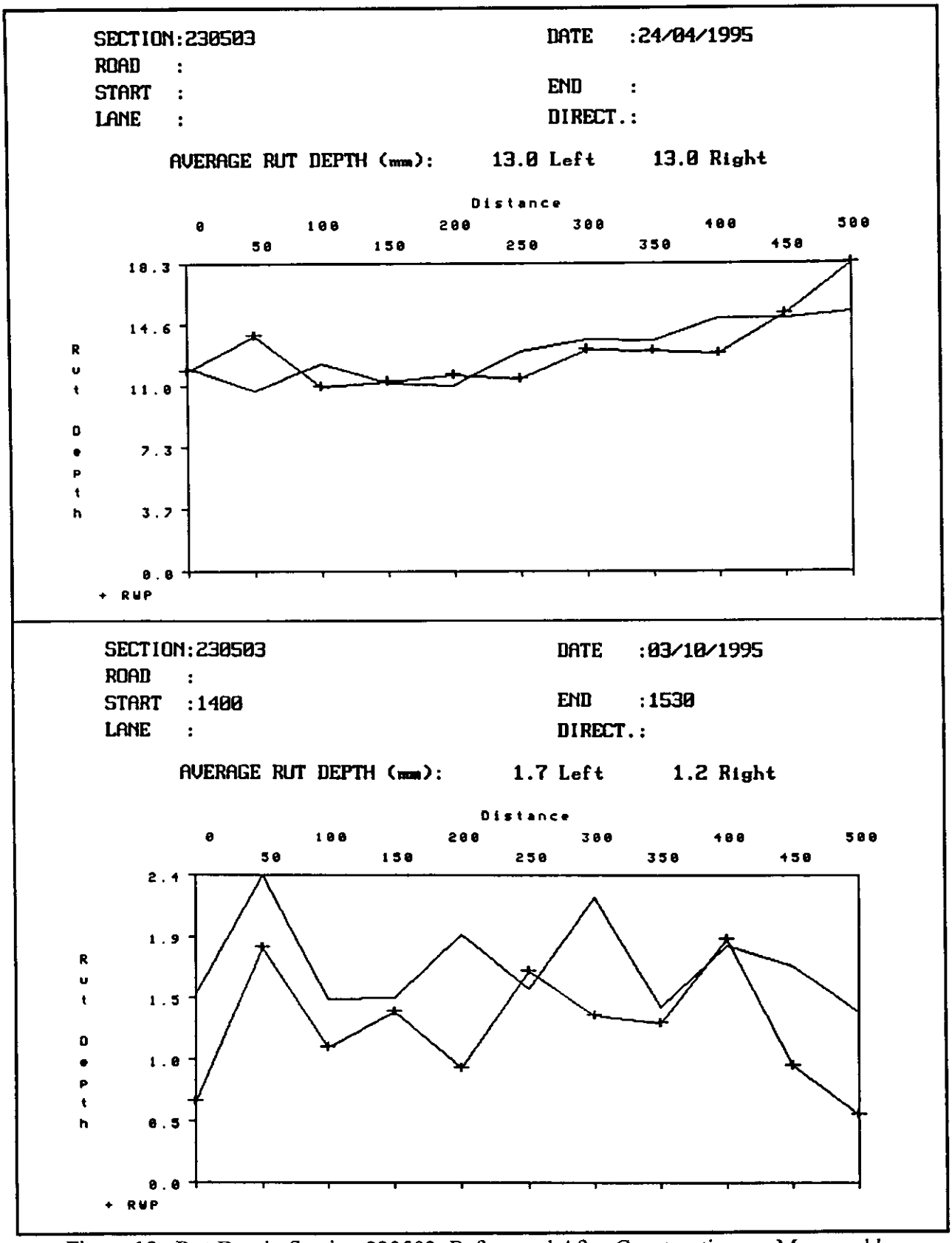


Figure 18. Rut Depth, Section 230503, Before and After Construction, as Measured by the Dipstick

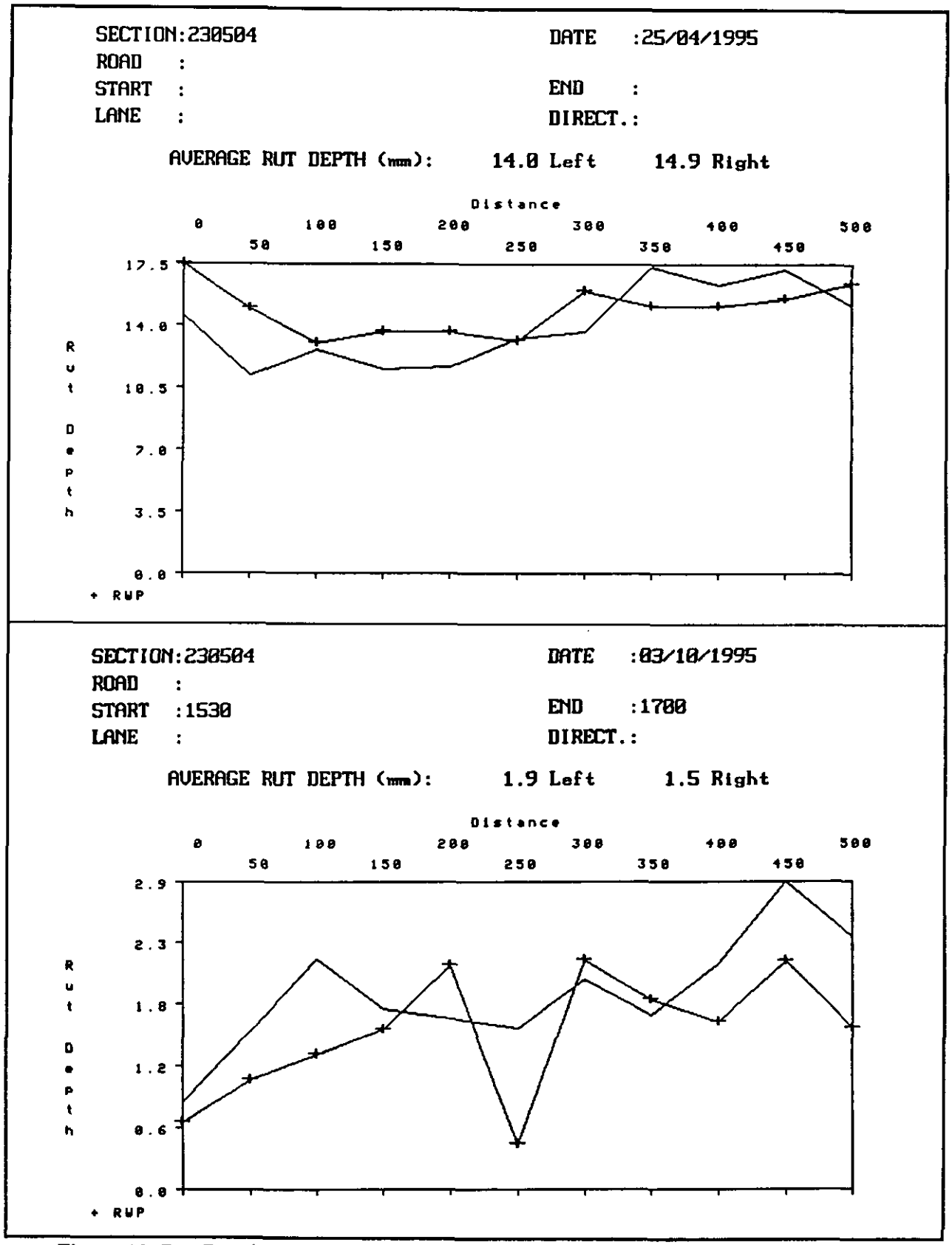


Figure 19 Rut Depth, Section 230504, Before and After Construction, as Measured by the Dipstick

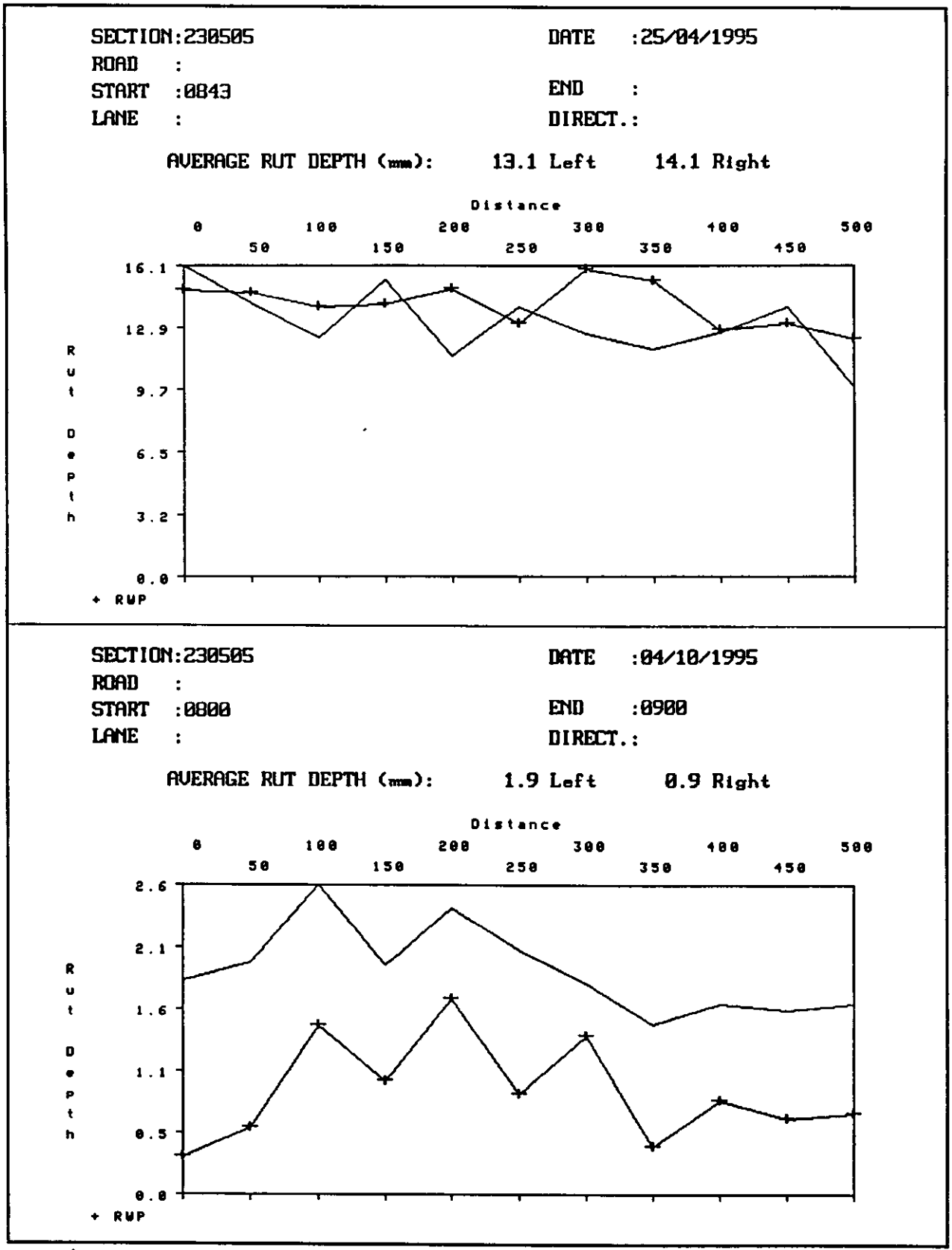


Figure 20. Rut Depth, Section 230505, Before and After Construction, as Measured by the Dipstick

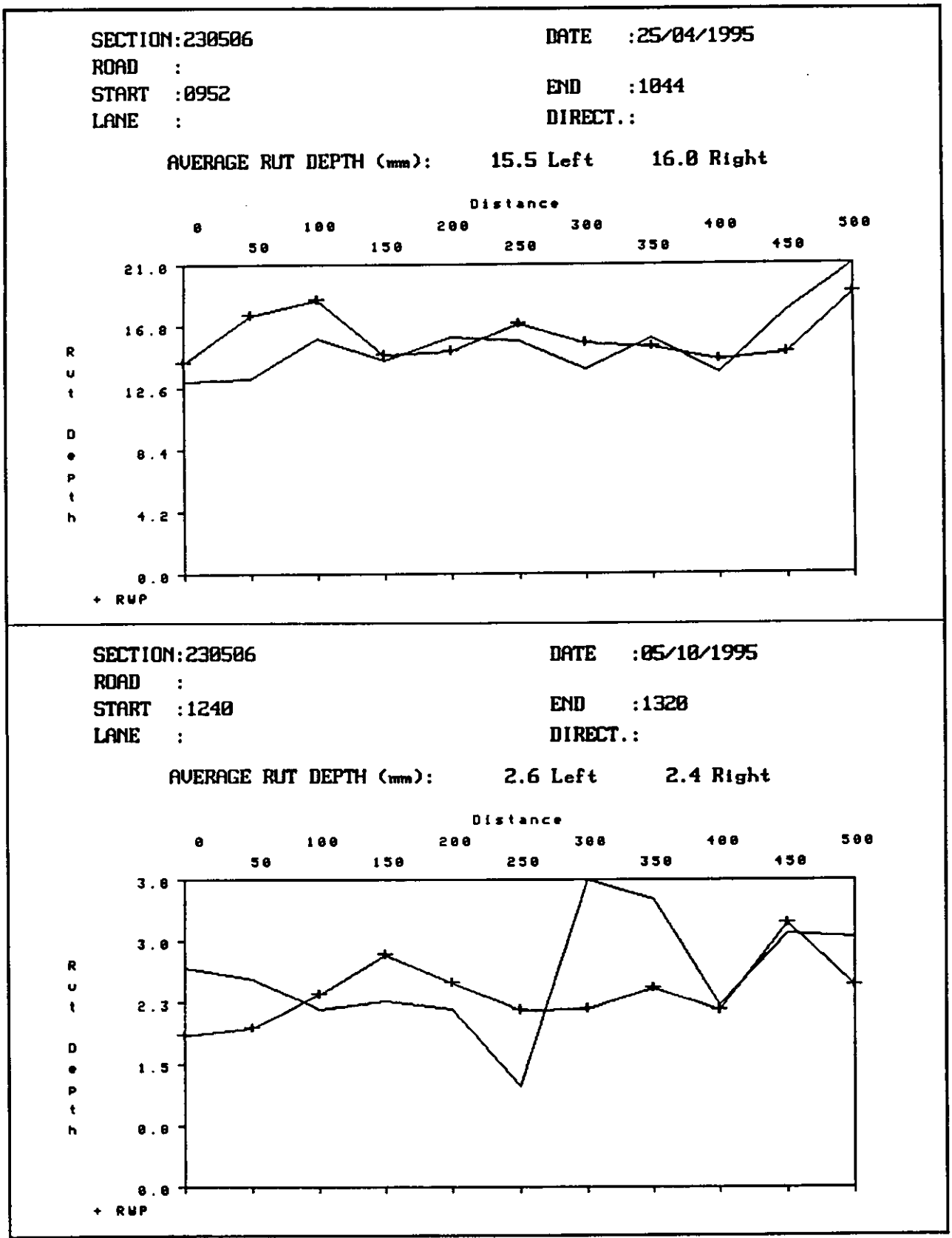


Figure 21. Rut Depth, Section 230506, Before and After Construction, as Measured by the Dipstick

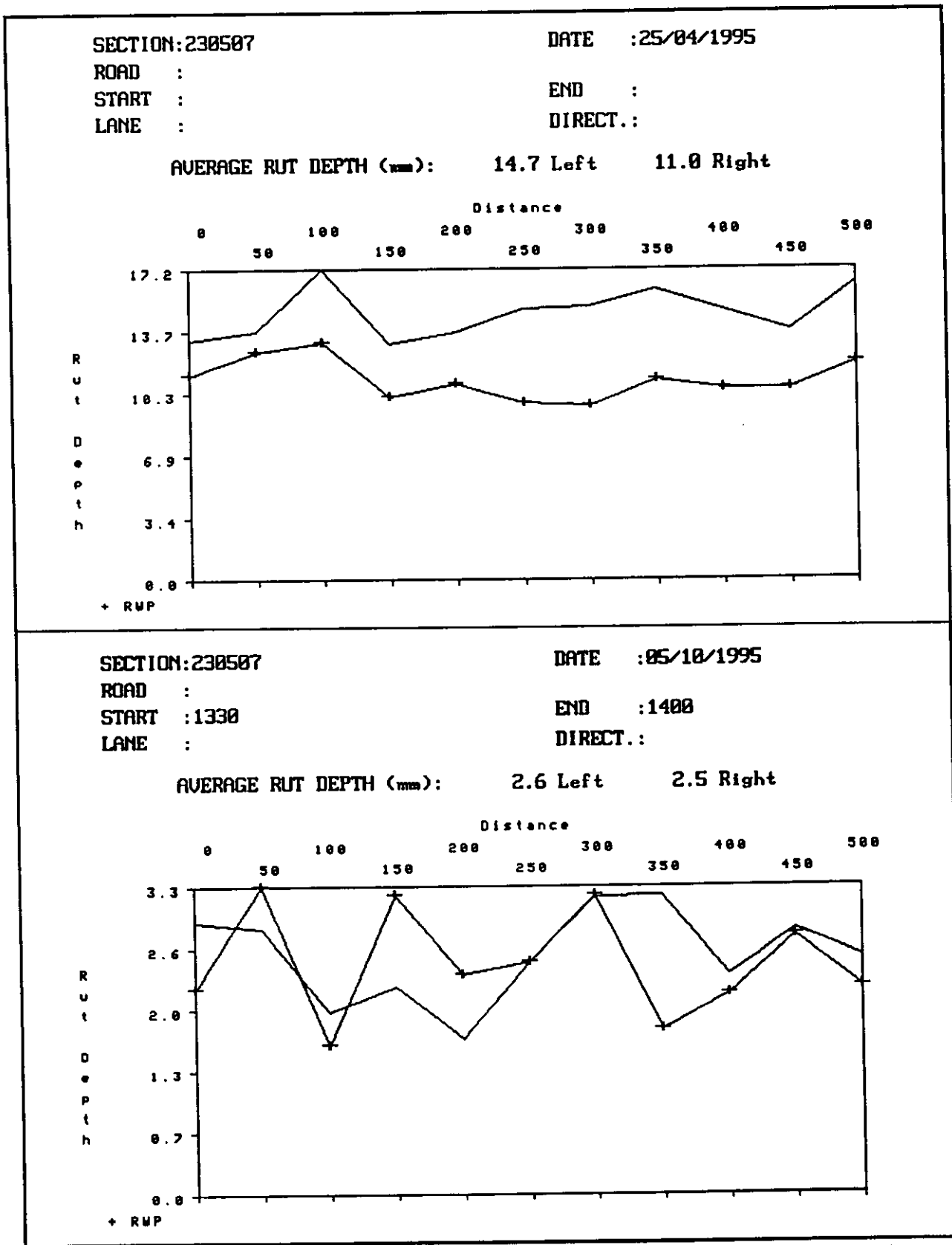


Figure 22. Rut Depth, Section 230507, Before and After Construction, as Measured by the Dipstick

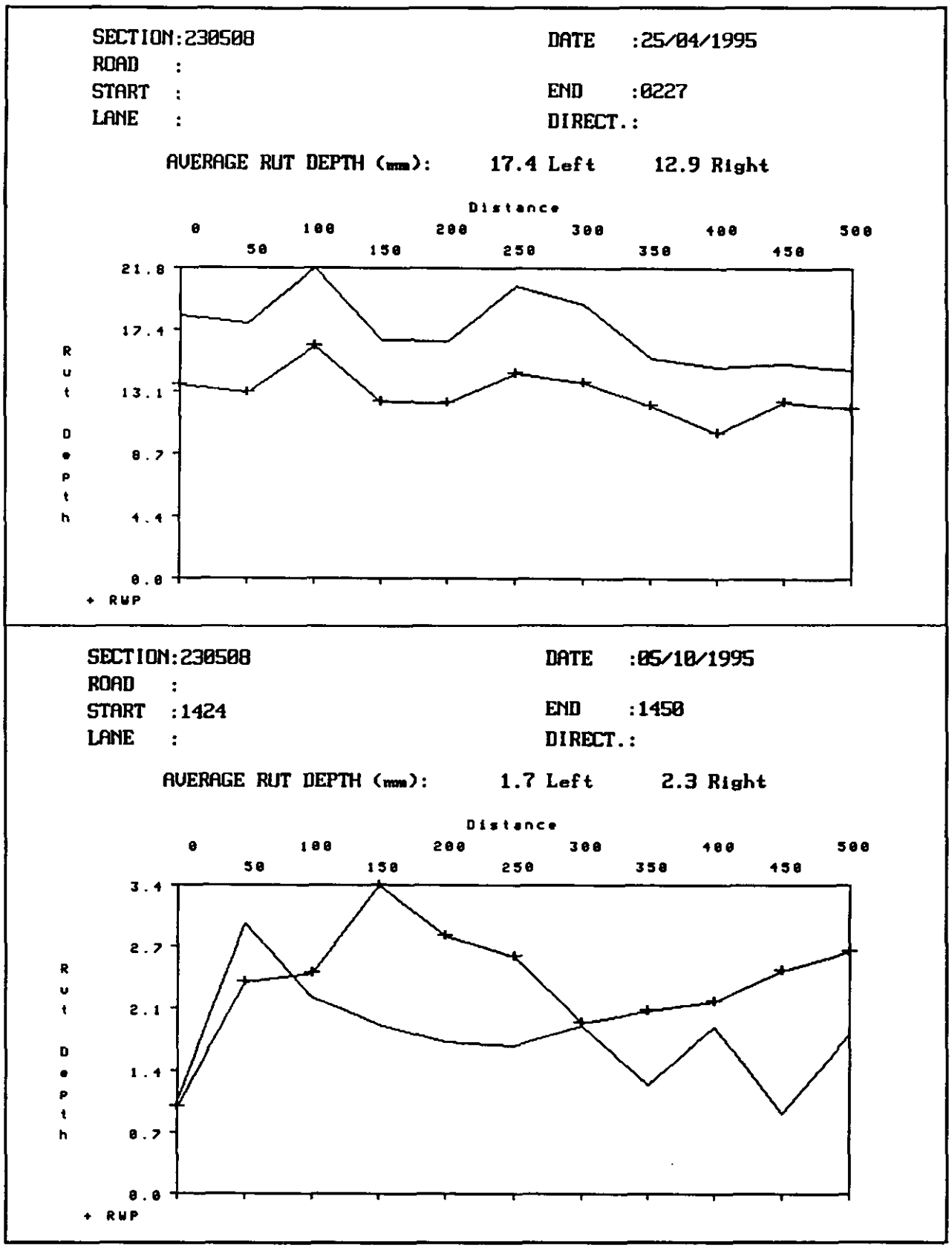


Figure 23. Rut Depth, Section 230508, Before and After Construction, as Measured by the Dipstick

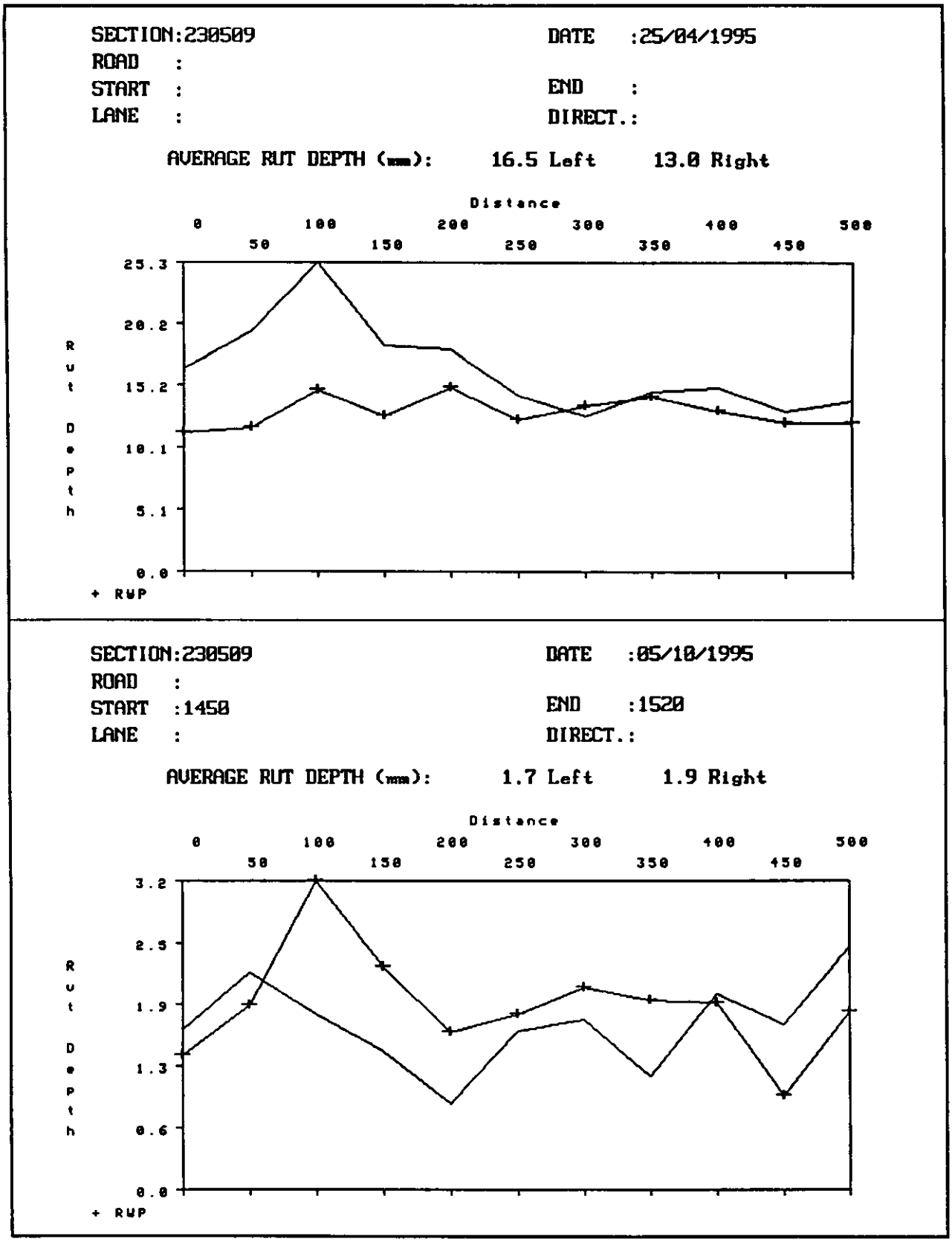


Figure 24. Rut Depth, Section 230509, Before and After Construction, as Measured by the Dipstick

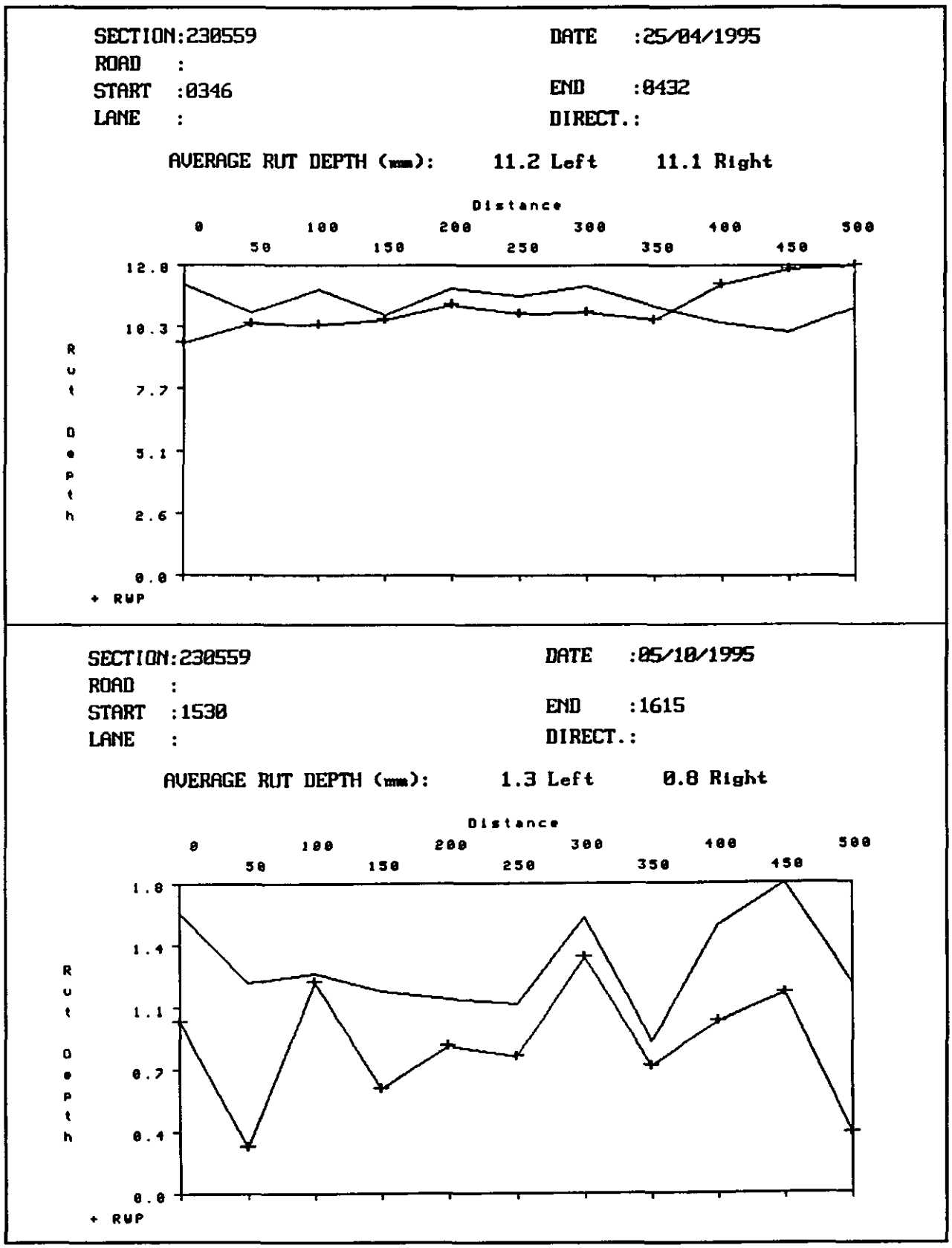


Figure 25. Rut Depth, Section 230559, Before and After Construction, as Measured by the Dipstick

APPENDIX A

Correspondence, Asphalt Plant Drum Mixer Profile, and Job Mix Formulas

PAVEMENT MANAGEMENT SYSTEMS

August 20, 1993
50450910-13.01.5

Mr. Warren Foster
Research and Development Engineer
Technical Services Department
Maine Department of Transportation
State House Station 16
Augusta, Maine 04333

RE: ME DOT SPS-5, Field Materials Sampling and Laboratory Testing Plans

Dear Warren,

Forwarded enclosed are the Field Materials Sampling and Testing Plans for the SPS-5 project on I95 NB, Argyle, ME.

The plans include the following:

Table 1	Scope of Pre-Construction and Post-Construction Materials Sampling and Field Testing.
Table 2	Laboratory Testing Plan for Pre-Construction and Post-Construction samples.
Table 3	Bulk Material Sampling and Testing During Construction for Laboratory Testing and for the SHRP Asphalt Reference Library.
Table 4	Pre-Construction Materials Samples: Locations and Test Protocols.
Figure 1	ME DOT SPS-5 Test Section Layout: Surface Preparation, Overlay Treatments, Sampling Areas.
Figures 2-1 to 2-4	Pre-Construction Materials Sampling Location Plans for Test Sections 1-9, and 59: 4", 6", 12" OD cores, Auger probes, Test Pits.
Figures 3-1 to 3-4	Post-Construction Materials Sampling Location Plans for Test Sections 2-9 and 59: 4" OD cores.

The figures are presented in a preliminary format at this time, as pre-construction sampling is scheduled for the last week in September.

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

Please forward the name and location of the laboratory where testing of these samples will be conducted, and the name, phone and fax number of the laboratory contact person. The laboratory will be assigned a reference number.

Please let me know if you need clarification of any of these Tables or Figures.

Yours Sincerely,
PAVEMENT MANAGEMENT SYSTEMS LIMITED

Bill Phang.

W.A. Phang, D.Eng.
Program Manager, FHWA-LTPP

BP/tf

c.c. I.J. Pecnik
W. Dunphy
B. Abukhater

PAVEMENT
MANAGEMENT
SYSTEMS

April 27, 1994
50450910-13.01.5

Mr. Warren Foster
~~Assistant Research and Development Engineer~~ Engineer of Technical Services
Maine State Department of Transportation
Transportation Building
State House Station 16
Augusta, Maine 04333

RE: SPS-5 Pre-Construction Sampling and Testing

Dear Mr. Foster:

Wilbur Dunphy suggested in his telephone call of April 27, 1994, that pre-construction sampling for the SPS-5 project on I-195 NB, Argyle, ME could be arranged to be carried out in June 1994.

I have asked Basel Abukhater, PMS, to coordinate the preparations and scheduling of these activities with Wilbur Dunphy. Basel will be the NARO representative during the field work, and he will assist in the labeling of samples and documentation of the work.

There have been changes in responsibilities for the resilient modulus, creep compliance, and associated laboratory testing, which will be done by the FWHA Laboratory Materials Testing Contractor, (LMTC) Law Engineering, Atlanta, GA. Upgraded materials testing tracking sheets will be prepared and sent to you shortly, indicating which samples are to be sent for testing by the LMTC.

Law Engineering has asked that materials samples should be shipped pre-paid in plywood boxes made as shown in the attached diagram from a single sheet of plywood.

Accompanying paperwork should be in accordance with the FHWA-LTPP Guidelines for Sample Receipt and Processing Directive M-6, dated April 04, 1994, copy enclosed.

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

Also enclosed are copies of the SPS-5 Maine Design Schematic, and pre-construction and post-constructions sampling location drawings.

Yours Sincerely,

William A. Phang

William A. Phang, D. Eng.
Program Manager, FHWA-LTPP
Pavement Management Systems Limited

WAP/tf

c.c. I.J. Pecnik
D. Morian
B. Abukhater

COPY

PAVEMENT MANAGEMENT SYSTEMS

May 4, 1994
50450910-12.01.2

Mr. Warren Foster
Engineer of Technical Services
Maine State Department of Transportation
Transportation Building
State House Station #16
Augusta, Maine 04333

RE: Samples for Resilient Modulus Testing by FHWA-LTPP Contractor Laboratory

Dear Mr. Foster:

As you may be aware Resilient Modulus tests on materials from SPS projects and GPS overlays are to be conducted by an FHWA-LTPP Contractor Laboratory. In the LTPP North Atlantic Region, (NARO) the Contractor is Law Engineering, Inc. in Atlanta, GA.

Samples from your SPS projects and GPS overlays collected in accordance with sampling and testing plans provided by NARO, are to be shipped pre-paid to the Law Engineering Laboratory. Instructions for labeling, packaging and shipping are enclosed.

Also enclosed for your information is Directive M-6 which describes the documentation for tracking the samples through the Laboratory.

Should you have any questions about these procedures, please do not hesitate to contact me.

Yours Sincerely,

William A. Phang, D. Eng.
Program Manager, FHWA-LTPP
Pavement Management Systems Limited

c.c. I.J. Pecnik
D. Morian
A. Rutka
B. Abukhater * See backside for Distribution

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

PAVEMENT
MANAGEMENT
SYSTEMS

June 02, 1994
50450910-13.01.5

Mr. Warren Foster
Engineer of Technical Services
Technical Services Division
Maine State Department of Transportation
State House Station #16
Augusta, Maine 04333-0016

RE: ME DOT SPS-5 AC Rehabilitation Project

Dear Mr. Foster:

Forwarded enclosed are revised Materials and Testing Sampling Plans and Laboratory Testing Tracking Tables. These revisions were necessitated by revised testing procedures, and by the change of responsibilities from SHRP to the FWHA-LTPP Division.

Enclosed are the following:-

Table 1	ME DOT SPS-5 Test Section Layout, I-95 NB, Alton, ME	2 pages
Table 2	ME DOT SPS-5 Laboratory Testing Plans (Pre-Construction, 2 pages), (Post-Construction, 1 page)	3 pages total
Table 3	SPS-5 Bulk Material Sampling and Testing During Construction	1 page
Table 4	Pre-Construction Field Materials Samples and Laboratory Tests	2 pages
Table 5	State Laboratory Pre-Construction Sampling and Laboratory Testing Tracking Table	1 page
Table 5A	FHWA-LTPP Contractor Laboratory Pre-Construction Sampling and Laboratory Testing Tracking Table	2 pages
Table 6	State Laboratory Pre-Construction Sampling and Laboratory Testing Tracking Table - Asphalt Concrete	1 page
Table 6A	FHWA-LTPP Contractor Laboratory Pre-Construction Sampling and Laboratory Testing Tracking Table - Asphalt Concrete	1 page

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

Table 7	State Laboratory During Construction Sampling and Laboratory Testing Tracking Table	2 pages
Table 8	State Laboratory Post-Construction Sampling and Laboratory Testing Tracking Table	1 page
Table 8A	FHWA-LTPP Contractor Laboratory Post-Construction Sampling and Laboratory Testing Tracking Table	1 page
	FHWA-LTPP SPS-5 Maine Design Schematic *	1 page
	Pre-Construction Sampling Plan for Section 230501-9 and 230559	10 pages
	Post-Construction Sampling Plan for Section 230501-9 and 230559	10 pages

The changes that were made are:-

1) Pre-Construction Sampling - added cores C79-81
2) During Construction - the locations for Bulk Sampling
3) Post-Construction - added cores C82-86 (* These changes have not yet been completed. We will forward the revised sheets as soon as they are available).

Yours Sincerely,

for Dennis A. Morian

William A. Phang, D. Eng.
Program Manager, FHWA-LTPP
Pavement Management Systems Limited

WAP/tf

c.c. I.J. Pecnik
D. Morian
B. Abukhater

PAVEMENT
MANAGEMENT
SYSTEMS

July 8, 1994
50451010-12.01

Mr. Wilbur Dunphy
Maine State Department of Transportation
Transportation Building
State House Station #16
Augusta, Maine 04333

Dear Mr. Dunphy:

As part of the necessary documentation to be forwarded with the SPS-5 cores to Law Engineering, Atlanta, please find enclosed the Field Material Sampling and Testing Log for coring completed June 06-08, 1994.

I am also enclosing the guidelines for labeling, packaging and shipping of the cores and Directive M-6 that describes the documentation for tracking the samples through the laboratory.

It would be appreciated if you would let me know when the cores are shipped to the lab, so that I may update our records of activity.

If you have any questions or need clarification on the above material, please contact me at your convenience.

Yours Sincerely,

Lois Egloff
Technical Coordinator
Pavement Management Systems Limited

LE/tf

C.C. W. Foster, ME, w/o attachment
I.J. Pecnik, RE, NARO, w/o attachment
W. Phang, NARO, w/o attachment
A. Rutka, NARO, w/o attachment
B. Abukhater, NARO, w/o attachment

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
NOTICE TO CONTRACTORS

Sealed proposals addressed to the State Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Proposal for building An Overlay and Guardrail Modification Project in the Towns of ALTON to HOWLAND" will be received by the Department at the office of the Commissioner, Transportation Building in Augusta, until 10:30 o'clock A.M. (prevailing time) on November 16, 1994 and at that time and place publicly opened and read.

Description: Maine Federal Aid Project No. IR-IM-95-8(152)
P.I.N. No.4921.00

Location: In Penobscot County this project is located on I-95 Northbound beginning at approximately the Alton-Old Town townline and extending Northerly 17.111 miles to approximately the Rte. 155 interchange in Howland, including a bridge rehabilitation at Birch Stream Bridge between the Towns of Alton and Argyle.

Outline of Work: Removing pavement surface, hot bituminous pavement, hot recycled pavement, guardrail and other incidental work.

For information contact Jerry Waldo, Tel No. (207) 941-4500. Hearing impaired persons may call the Telecommunication Device for the Deaf at (207) 287-3392.

Plans, specifications and proposal forms may be seen at the State Department of Transportation, State House Station #16, Augusta, Maine 04333-0016 Tel. No. 287-1155 and may be purchased from the Department. Full size plans at $30.00 ($34.50 by mail) or half size plans at $25.00 ($28.00 by mail), Single sheet $2.00 each, Proposal Book $7.00, payment in advance, all non-refundable.

Each proposal must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, a cashier's check, a certified check, certificate of deposit or a United States postal money order in the amount of $65,000.00 payable to Treasurer of State as a proposal guarantee.

This contract is subject to all appropriate Federal Laws, including Title VI of the Civil Rights Act of 1964.

All work shall be governed by "State of Maine" Department of Transportation, Standard Specifications, Revision of October 1990, price $10, $13 by mail.

A Contract Performance Surety Bond and a Contract Payment Surety Bond each in the amount of 100 percent of the contract price will be required of the successful bidder.

The right is hereby reserved to reject any or all proposals.

Augusta, Maine
October 26, 1994

THEODORE H. KARASOPOULOS
CHIEF ENGINEER

STATE OF MAINE THEODORE H. KARASOPOULOS 1935 REGISTERED PROFESSIONAL ENGINEER

Sheet No. 1 of _____

FOEL

ORIGINAL

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
TRANSPORTATION BUILDING
STATE HOUSE STATION 16 AUGUSTA, MAINE 04333-0016

ALDEN G. SMALL
Acting Commissioner

January 13, 1995

JAN 17 1995

JOB #
FILE # 12.01

Mr. Richard Boudreau
Law Engineering, Inc.
396 Plasters Ave., N.E.
Atlanta, Georgia 30324

Dear Mr. Boudreau:

This letter is to inform you that there are five (5) boxes enroute to Law Engineering, Inc. via Yellow Freight Company. The five (5) boxes were picked up at our office on January 12, 1995. As requested, you will find the paperwork for each project sampling in the box which is marked "Paperwork Enclosed" for the two (2) projects which were done in the State of Maine during the summer of 1994. The projects are as follows:

Argyle, Maine	ID No. 230500	4 boxes
Bethel, Maine	ID No. 231028	1 box

I have also enclosed in the Argyle, Maine box, a copy of the total core lengths as measured in our laboratory for both the samples retained by us and the cores that were to be shipped to you.

I apologize for the late shipping. If you have any questions, you can contact me at (207) 941-4534.

Sincerely,

Wilbur J. Dunphy

Robert E Ruhlin

By Robert E. Ruhlin
MDOT Concrete Lab

bep
cc: Lois Egloff, Pavement Management Systems
William Phang, Pavement management Systems
Wilbur J. Dunphy
M. Alley
File

PAVEMENT
MANAGEMENT
SYSTEMS

May 9, 1995
50451010-13.01.5

Mr. Warren Foster
Engineer of Technical Services
Maine State Department of Transportation
State House Station #16
Augusta, Maine 04333-0016

RE: ME DOT SPS-5: Laboratory Testing Plan - Updated Tables

Dear Mr. Foster:

Forwarded enclosed are some updated tables for the laboratory testing plans of the SPS-5 project. Please substitute these new tables, dated May 8, 1995, for the ones sent to you in June 1994.

Table 2 (3 pages) now includes a "test conducted by" column assigning tests to the agency laboratory or to the FHWA Contractor Laboratory (Law Engineering, Atlanta). Table 3 (1 page) has added clarification of aggregate sampling. Table 5 (1 page) adds moisture testing to agency tests. Cores reassigned to creep compliance testing are removed from Table 8 (1 page). Table 8A (1 page) clarifies the cores assigned to creep compliance testing.

Mr. Basel Abukhater will be assisting your staff in labeling the samples and in the paperwork to acquire the special containers and that accompany the shipments to the Materials Reference Library and to the FHWA Contractor Laboratory, Law Engineering, Atlanta, GA.

Yours Sincerely,

William A. Phang
Program Manager
Pavement Management Systems Limited

enclosures

C.C. B. Abukhater, PMSL, w/enclosures
E. Lesswing, NARO, w/enclosures
I.J. Pecnik, RE, NARO, w/enclosures

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
INTERDEPARTMENTAL MEMORANDUM

Date: 5/31/95

To: File **Dept:** Construction

From: Jerry Waldo **Dept:** Construction

Subject: SHARP - PrePaving Meetings for Alton - Howland

The Prepaving Conferences for this project was held in two parts due to the experimental area and approval of mix designs. Prior to the Prepaving meetings a meeting was held to clarify the intended work at the SHARP Experimental site. The following is a summary of those meetings highlighting the sequences of the work.

The initial meeting was held May 4, 1995 and the SHARP work was detailed as follows:

Section #1 --- This section is the control section and will not be paved.

Sections #2&#5 — 2" Overlays

These sections will be paved as follows: The travel lane will be paved first with the initial layer set at 3/4" minimum depth and set for cross-slope. Then the 1 1/4" final layer will be placed. The passing lane will receive one layer matching centerline and placed at proper cross-slope.

Sections #3&#4 — 5" Overlays

These sections will be paved as follows: The travel lane binder will be placed in two layers at 1 1/2". The first layer will be used to correct cross-slope. The second will also placed with cross-slope control. The surface will be placed in one 2" layer. The passing lane will be paved in the same manner.

Sections #6&#9 — 3 1/2" Overlay on 1 1/2" Milled Area

These section will be milled to cross-slope in the travel lane and adjacent shoulder and then paved back. The same will be done in the passing lane. The surface will then be placed in the passing lane and finally the Travel lane and adjacent shoulder.

Sections #7&#8 — 6 1/2" Overlay on 1 1/2" Milled Area

These sections will be milled in the travel lane and adjacent shoulder only. The milling will be done first and paved back. Then the binder will be placed in two layers and traffic switched. The binder in the passing lane will then be placed in two layers, correcting the cross-slope. The surface will then be placed in the passing lane followed by the travel lane.

Cores for calibrating the nuclear density gauge will be taken in the sample areas shown on the plans.

PrePaving Meeting - May 12, 1995

Attendees:

Jay Kemm, Lane Construction
Ken Anderson, Lane Construction
Ron Starr, Lane Construction
Rodney Lane, Lane Construction

Dale Mayo, MDOT
Joe Stewart, MDOT
Wade McClay, MDOT
Jerry Waldo, MDOT
Jim Osgood, MDOT

Initially determined to have second PrePaving meeting on May 24, 1995 to discuss the paving in the SHRP Test site.

Lane was informed that all mix designs should be complete prior to prepaving meeting so the full sequence of the operations can be discussed and to assure that there will not be problems getting passing designs through normal processes. At this time only the 'D' and 'C' had been approved.

Portable BITUMA Plant is setup in Alton and is inspected, ready to produce mix.

Paver will be Blaw-Knox 180 with Omni-Screed.

Standard rolling train with vibratory knock-down, pneumatic and finish roller.

Special attention will be exercised in filling the large cracks at centerline and edges of travel way.

The pneumatic will be used as knock-down when placing the initial layer in milled areas.

Shim will correct the cross-slope.

Box areas at Howland exit where milling went through pavement and place two inches of binder.

Starting Monday the 15th with shim in section 3 followed by section 5, then section 1. Plan to complete section 1 except approach to Birch Stream bridge and then give the area to Diaz for the bridge work and close off section 2.

Plan to start section 2 the third week of June. This includes the SHRP area.

Contractor would like to put in rumble strip when machine is in the area and a section is ready. No problem with that.

Truck traps mentioned again; Contractor assured they are in proper condition.

May 24, 1995

Additional people present: Basal Abukhater, John Dunphy, Joe Anderson

The purpose of this meeting was to fine tune the paving of the test area to coordinate the testing needed by SHRP.

Plan to start area 6/12/96. Goal is to complete all lower work so surface can be placed in one operation from beginning of section II through the entire test area.

Will start with milling and complete the four areas, then initial layers of overlay commencing surface 6/19/95. Plan to complete the paving 6/24/95.

Above dates are weather dependent.

PMS

FAXED 1445 29/95

To: Maine DOT
Technical Services Division
State House Station 16
Augusta, ME 04333

From: Basel Abuklaler
Pavement Management Systems Limited
152 Main Street
CAMBRIDGE, Ontario N1R 6R1
(519) 622-2580 (Fax)
(519) 622-3005 (Telephone)

Attention: Wilbur Dunphy

Date: 95-06-29 Time: 1445

Reference: SPS-5 Project on I-95

No. of Pages 2 including this page.

Fax No.: (207) 287-8757

Project No.: 5045010

SAGE:

Attached is "MRL Operations Form-1" which should go with the shipment to MRL in Reno, Nevada.

Another copy should go by mail with a letter from you stating that the shipment have already left ME towards Nevada.

Again thank you very much for your help and cooperation during the work at this project.

Note: I got your fax yesterday of the information I needed.

LTPP-MRL SPS MATERIAL SAMPLING AND TESTING SHIPMENT INVENTORY

ELD OPERATIONS INFORMATION FORM-1 SHEET# One OF One

LTPP REGION: NA | STATE: ME | STATE CODE: 23

SPS EXPERIMENT#: 5 | ROUTE/HWY #: I-95 | TEST SECTION #: 0500

FIELD WORK COMPLETED: 95-06-27 | FIELD SET #: 1

SAMPLE INFORMATION

LOCATION	NUMBER	SIZE *	TYPE	MATERIAL	CONDITION
230503 BR1	BR01	3 pails	Bulk	AC Binder 30% RAP	Good
BR4	BR04	3 pails	Bulk	AC Surface 30% RAP	Good
230504 BV1	BV01	3 pails	Bulk	AC Binder Virgin	Good
BV4	BV04	3 pails	Bulk	AC Surface Virgin	Good
230507 BV3	BV03	3 pails	Bulk	AC Binder Virgin	Good
BV6	BV06	3 pails	Bulk	AC Surface Virgin	Good
230508 BR2	BR02	3 pails	Bulk	AC Binder 30% RAP	Good
BR5	BR05	3 pails	Bulk	AC Surface 30% RAP	Good
ANE ASPHALT PLANT	BC01	3 pails	Bulk	AC Cement	Good
ANE ASPHALT PLANT		1 Drum	Bulk	Recycled AC	Good
		1 Drum	Bulk	Aggregate Used in Virgin Binder Mix	Good
		1 Drum	Bulk	Aggregate Used in Virgin Surface Mix	Good
		1 Drum	Bulk	Aggregate Used in 30% RAP Binder Mix	Good
		1 Drum	Bulk	Aggregate Used in 30% RAP Surface Mix	Good

GENERAL REMARKS Pails are 5 gal. (20L) and Drums are 55 gal. (200L) Capacity.

Wilbur Murphy
ME DOT
CERTIFIED BY CONTRACTOR OR
DESIGNATED FIELD REPRESENTATIVE

Basel Abukhater
PMSL /NARO
VERIFIED & APPROVED
LTPP REPRESENTATIVE

95-06-29
DATE

PAVEMENT MANAGEMENT SYSTEMS

July 7, 1995
50451110-13.01.5

Mr. Wilbur Dunphy
Maine State Department of Transportation
State House Station #16
Augusta, Maine 04333

Dear Mr. Dunphy:

Following up on the pre-construction sampling of the SPS-5 project in Argyle, June 1995, please find enclosed two copies of the Field Material Sampling and Testing documentation.

One of these copies is for your personal record and use, while the other is to be transmitted to the State Laboratory with the samples.

If you have any questions, please contact either Mr. Basel Abukhater or myself.

Yours Sincerely,

Lois Egloff
Technical Coordinator
Pavement Management Systems Limited

LE/tf

enclosure

C.C. B. Abukhater, w/o enclosure

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
TRANSPORTATION BUILDING
STATE HOUSE STATION 16 AUGUSTA, MAINE 04333-0016

mdot

JOHN G. MELROSE
Commissioner

JUL 25 1995

July 19, 1995

Basel Abukhater
Pavement Management Systems
152 Main Street
Cambridge, Ontario
Canada N1R 6R1

Dear Basel:

Attached are the complete survey notes for the SPS-5 and GPS 231001 sections. Now that the Survey Section has located the LTPP sections, I will re-mark them as prescribed. Brandt Henderson informed me that the profilometer will be gathering data on the remaining sites in Maine on August 16 and 17.

Still don't have any more information on the possible loss of one five gallon bucket sample from the SPS sampling activity. Hope we have better luck today and tomorrow. Will keep you informed.

Sincerely yours,

Wilbur

Wilbur J. Dunphy
Research & Development

leb
encl.

cc: D. Peabody, Asst. R & D Engr.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
TRANSPORTATION BUILDING
STATE HOUSE STATION 16 AUGUSTA, MAINE 04333-0016

mdot

JOHN G. MELROSE
Commissioner

SEP 1 3 1995

September 14, 1995

William Phang
Program Manager NARCO
Pavement Management Systems
415 Lawrence Bell Drive, Unit #3
Amherst, NY 14221

Dear Bill:

Enclosed are the completed Rehabilitation Data forms for the GPS 231001 site on Route I-95 in Howland, Maine. Also, both the Construction Data and Rehabilitation Data forms for the SPS-5 project on Route I-95 in Argyle are included.

The samples obtained on the SPS-5 project were taken by Coles Express, Inc. from the Lane Construction Corp. bituminous plant in Alton on July 13, 1995. I have been unable to determine if they ever arrived in Sparks, Nevada, or not.

Best regards.

Sincerely yours,

Wilbur

Wilbur J. Dunphy, P.E.

WJD/dg

cc: D. Peabody w/o encl.

Encl: 154 pages

PAVEMENT
PMS MANAGEMENT
SYSTEMS

November 8, 1995
50451110-12.01

Mr. Wilbur Dunphy
Maine Department of Transportation
State House Station #16
Augusta, Maine 04333

Dear Mr. Dunphy:

Following up on the recent sampling of the ME SPS-5 project and the GPS 231001 post overlay, please find enclosed the following for your use and distribution.

Personal Copies

230500	Field Material Sampling and Testing, October 03-05, 1995 Laboratory Tracking tables (ME DOT and FHWA)
231001	Field Material Sampling and Testing October 05, 1995

ME DOT Laboratory

230500	Field Material Sampling and Testing, October 03-05, 1995 ME DOT Laboratory Tracking tables

FHWA Laboratory

230500	Field Material Sampling and Testing, October 03-05, 1995 FHWA Laboratory Tracking tables
231001	Field Material Sampling and Testing, October 05, 1995 FHWA Laboratory Tracking tables Layer thickness data

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

Please keep in mind when shipping samples to the FHWA laboratory, a copy of their documentation is to be included with the samples as well as a copy sent with your covering letter in the mail. It would be useful for our record keeping if you would let us know when your samples have been shipped to both laboratories. Thank you.

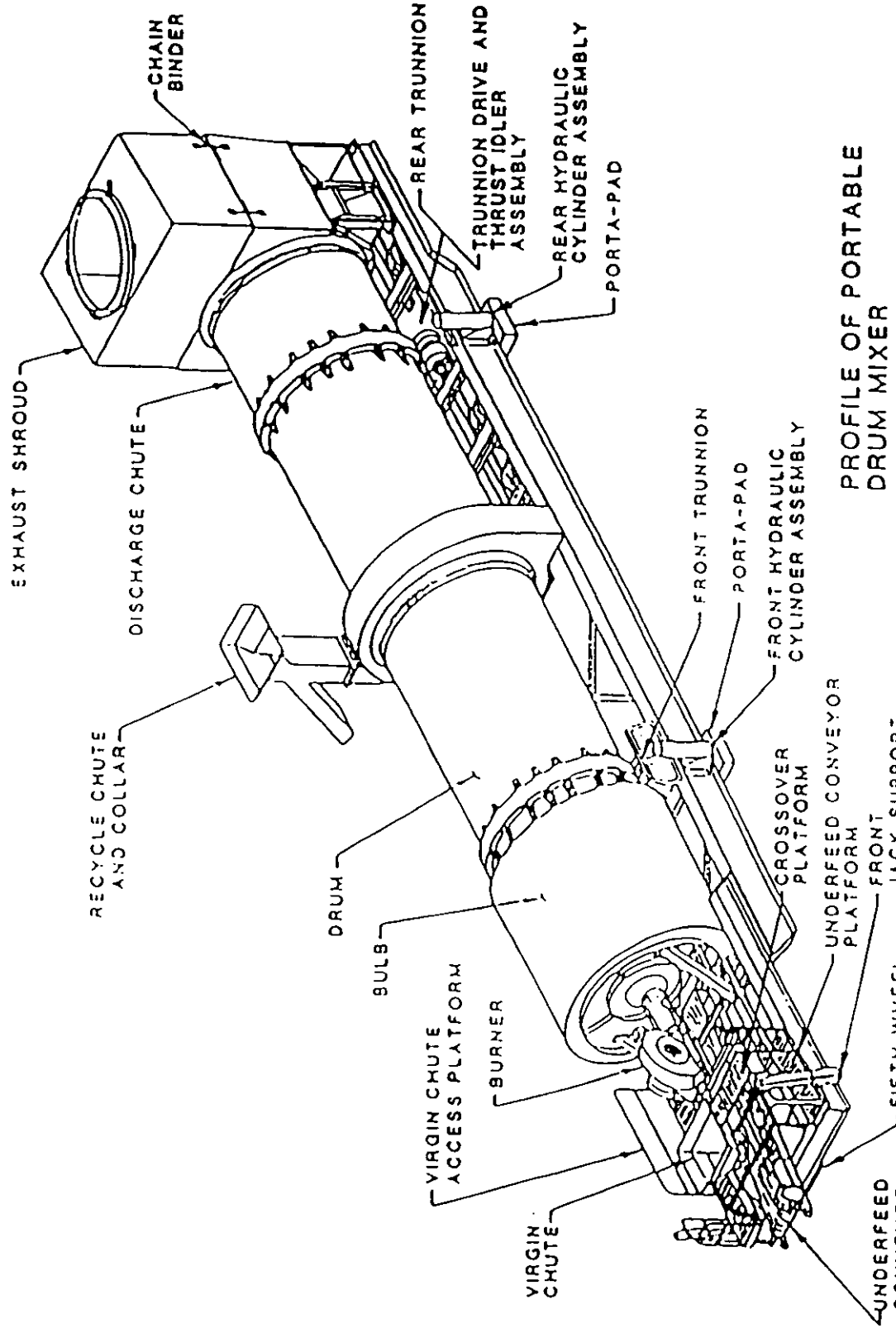
Yours Sincerely,

Lois Egloff
Technical Coordinator
Pavement Management Systems Limited

LE/tf

enclosure

C.C. W.A. Phang, D.Eng., NARO, w/o enclosure
E. Lesswing, NARO, w/o enclosure
B. Abukhäter, NARO, w/o enclosure


PROFILE OF PORTABLE DRUM MIXER
CHAIN BINDER
REAR TRUNNION
TRUNNION DRIVE AND THRUST IDLER ASSEMBLY
REAR HYDRAULIC CYLINDER ASSEMBLY
PORTA-PAD
EXHAUST SHROUD
DISCHARGE CHUTE
FRONT TRUNNION
PORTA-PAD
FRONT HYDRAULIC CYLINDER ASSEMBLY
RECYCLE CHUTE AND COLLAR
DRUM
BULB
CROSSOVER PLATFORM
UNDERFEED CONVEYOR PLATFORM
FRONT JACK SUPPORT
VIRGIN CHUTE ACCESS PLATFORM
BURNER
FIFTH WHEEL ASSEMBLY
VIRGIN CHUTE
UNDERFEED CONVEYOR ASSEMBLY

	STATE OF MAINE	Job Mix No.(DOT) 600108
HOT BITUMINOUS	DEPARTMENT OF	Date: April 25,1995
PAVEMENT JOB MIX	TRANSPORTATION	Contractor: Lane Const.
		Item No. 403.10 & 403.101
	PLANT DATA	Grading: "D" Mix (Shim)
1. Make: Bituma	Size: 300 TPH Type: Drum	Location: Alton
2. Make: Caterpillar	Size: 365 TPH Type: Drum	Location: Alton

BITUMEN DATA

MATERIAL			Viscosity 275F
Source No.1 Type AC Grade: 10	Refiner: Irving Oil	Supplier:Irving	cSt
Source No.2 Type AC Grade: 10	Refiner: Chevron	Supplier:Barrett Paving	cSt

AGGREGATE DATA

Size	Pit or Cry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX	Lane - Alton	Alton	Lane Const.
2. Millings		Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX	Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX	Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX	Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1. 8			100	100	43	9	4	4	3	3	2	2	1.8
2. 8			100	100	87	78	55	43	35	26	18	12	8.4
3. 15			100	100	100	72	8	5	5	4	3	3	1.7
4. 38			100	100	100	100	94	64	44	30	19	11	7.9
5. 99			100	100	100	98	74	57	40	23	12	7	4.5
Resultant			100	100	100	95	70	51	36	22	13	8	5.1
JOB MIX													
Aim			100	100	100	95	70	51	36	22	14	9	5
Range			100	100	100	100	77	57	41	26	18	12	7
			100	100	100	95	63	46	31	18	10	6	3
Specification			100	100	100	100	80	65	55	40	30	22	8
Limits			100	100	100	95	60	46	25	16	10	6	3

SUBMITTED BY (Signature) ok

Print Name Dave Fogg Title: Quality Control

Approved..... Rejected..... DOT USE ONLY

	Bitumen	Mix Temperatures		Materials Data
	% Mix	Plant	Street	SpGr of blend agg by
Aim	6.0 %	290°	290°	Rice Vacuum = 2.677
Range	5.8-6.4	270°-310°	270°-310°	Sand Equiv. Val = 64
				Degradation Val = 54

Quality Results

	Mat Del.	Absorp.	Sp.Gr.	Year
1.	~	~	~	~
2.	~	~	~	~
3.	~	1.05	2.70	95
4.	~	1.01	2.67	95
5.	~	1.56	2.69	95

Lab Design No. 86

Job Mix No. LAN-AL-1 Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration.

Stability @ 6.0% = 28 V = 2.5% tested 5/11/95

Washed = +2.5% minus #200

Gyro @ 6.4% @ 60 sen = 95.20%, MSF @ 300 sen = 0.34, MST @ 300 sen = 8/9

Date 5/11/85 Signature Art Fillsbury Title Chief of Bit. Design

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

EF# : 600108 Material :MIX DESIGN - D Job Mix :LAN-AL-1
mple Location: LANE - ALTON
test: 0 Binder: 10

EEM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
MPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
RCENT BINDER.....	5.5	6.0	6.4	6.5	7.0			
RR. STAB. AT 5000.....	32	28	18	0	0		----	05/11
LK DENSITY.....	2.363	2.376	2.381	2.366	2.382		.000	
M.D.....	2.454	2.436	2.422	2.418	2.401		.000	
M.A.....	16.5	16.4	16.6	17.2	17.1		.0	
RCENT V.M.A. FILLED...	77	85	90	87	95			
RCENT OF VOIDS IN MIX.	3.7	2.5	1.7	2.2	0.8		100.0	
RCENTAGE OF T.M.D.....	96.3	97.5	98.3	97.8	99.2		.0	

BINDER :	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5
T.M.D. :	2.454	2.451	2.447	2.443	2.440	2.436	2.433	2.429	2.425	2.422	2.418

MMENTS :

LATED TESTING

MDOT * Degradation	54
T 30 * % Passing #200	
T 11 * % Finer than #200	7.6
T176 * Sand Equivalent	64
T246 * Eff. Sp Gr. Agg	2.673

Reported By: _____

Date Reported: _____

HOT BITUMINOUS PAVEMENT JOB MIX	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	Job Mix No.(DOT) 600114
		Date: May 8,1995
		Contractor: Lane Const.
		Item No. 381.09 & 403.07
	PLANT DATA	Grading: "B" Mix (Virgin 15% RAP)
1. Make: Bituma	Size: 500 TPH Type: Drum	Location: Alton
2. Make: Caterpillar	Size: 365 TPH Type: Drum	Location: Alton

BITUMEN DATA

	MATERIAL		Viscosity 275F
Source No.1 Type AC Grade: 10	Refiner: Irving Oil	Supplier: Irving	cSt
Source No.2 Type AC Grade: 10	Refiner: Chevron	Supplier: Barrett Paving	cSt

AGGREGATE DATA

Size	Pit	Qry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX		Lane - Alton	Alton	Lane Const.
2. Millings			Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX		Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX		Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX		Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

	% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1.	40			100	100	43	8	4	4	3	3	2	2	1.8
2.	0			100	100	87	78	55	43	35	26	18	12	8.4
3.	10			100	100	100	72	8	5	5	4	3	3	1.7
4.	10			100	100	100	100	94	64	44	30	19	11	7.9
5.	40			100	100	100	98	74	57	40	23	12	7	4.5
Resultant				100	100	77	60	41	31	22	14	8	5	3.9

JOB MIX

Aim	100	100	77	60	41	31	22	14	9	7	4
Range	100	100	84	67	48	37	27	17	13	10	6
	100	90	70	53	34	25	17	11	6	4	2
Specification Limits	100	100	85	0	60	50	39		24	16	8
	100	80	50	0	28	20	14		6	4	1

ok

SUBMITTED BY _____ (Signature)

Print Name Dave Fogg Title: Quality Control

Approved.....X Rejected..... DOT USE ONLY

	Bitumen	Mix Temperatures		Materials Data
	% Mix	Plant	Street	SpGr of blend agg by
Aim	5.2%	290°	290°	Rice Vacuum = 2.68
Range	5.0-5.6	270°-310°	270°-310°	Sand Equiv. Val = 64
				Degradation Val = 70

Quality Results

	Mat	Del.	Absorp.	Sp.Gr.	Year
1.	〃	1.09	2.69	95
2.	〃	〃	〃	〃
3.	〃	1.05	2.70	95
4.	〃	1.01	2.67	95
5.	〃	1.56	2.67	95

Lab Design No. 92

Job Mix No. LAN-AL-7 Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration. Tested 5/19/95

Stability @ 5.2% = 40 V = 2.1%

Washed = +1.1% minus #200

Hyro @ 5.2% @ 60 sec = 94.39%, MSF @ 300 sec = 1.20, MSI @ 300 sec = 8/8

Date 5/19/95 Signature Art Titus Jr. Title Chief of Bit. Design

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

REF# : 600114 Material :MIX DESIGN - B Job Mix :LAN-AL-7
Sample Location: LANE - ALTON
Retest: 0 Binder: 10

HVEEM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
COMPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
PERCENT BINDER.....	4.5	5.0	5.2	5.5	6.0			
CORR. STAB. AT 5000.....	39	37	40	33	31		----	05/19
BULK,DENSITY.....	2.374	2.398	2.419	2.433	2.424		.000	
T.M.D.....	2.497	2.478	2.471	2.460	2.442		.000	
V.M.A.....	15.4	15.0	14.4	14.2	15.0		.0	
PERCENT V.M.A. FILLED...	68	78	85	92	95			
PERCENT OF VOIDS IN MIX.	4.9	3.2	2.1	1.1	0.7		100.0	
PERCENTAGE OF T.M.D.....	95.1	96.8	97.9	98.9	99.3		.0	

BINDER :	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5
T.M.D. :	2.497	2.493	2.490	2.486	2.482	2.478	2.475	2.471	2.467	2.464	2.460

COMMENTS :

RELATED TESTING

MDOT * Degradation	70
T 30 * % Passing #200	
T 11 * % Finer than #200	4.6
T176 * Sand Equivalent	64
T246 * Eff. Sp Gr. Agg	2.680

Reported By: _____

Date Reported: _____

	STATE OF MAINE	Job Mix No.(DOT) 600109
HOT BITUMINOUS	DEPARTMENT OF	Date: MAY 3,1995
PAVEMENT JOB MIX	TRANSPORTATION	Contractor: Lane Const.
		Item No. 403.08
	PLANT DATA	Grading: "C" Mix
1. Make: Bituma	Size: 500 TPH Type: Drum	Location: Alton
2. Make: Caterpillar	Size: 365 TPH Type: Drum	Location: Alton

(Virgin Warm Mix Surface)

BITUMEN DATA

	MATERIAL		Viscosity 275F
Source No.1 Type AC Grade: 10	Refiner: Irving Oil	Supplier:Irving	cSt
Source No.2 Type AC Grade: 10	Refiner: Chevron	Supplier:Barrett Paving	cSt

AGGREGATE DATA

Size	Pit	Qry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX		Lane - Alton	Alton	Lane Const.
2. Millings			Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX		Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX		Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX		Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1. 15			100	100	43	8	4	4	3	3	2	2	1.8
2. 0			100	100	87	78	55	43	35	26	18	12	8.4
3. 25			100	100	100	72	8	5	5	4	3	3	1.7
4. 20			100	100	100	100	94	64	44	30	19	11	7.9
5. 40			100	100	100	98	74	57	46	23	12	7	4.5
Resultant			100	100	91	78	51	37	27	17	10	6	4.1

JOB MIX

Aim	100	100	91	78	51	37	27	17	11	7	5
Range	100	100	98	85	58	43	32	21	15	10	7
	100	100	84	71	44	31	22	13	7	4	3
Specification	100	100	100	100	70	52	40	30	22	14	7
Limits	100	100	80	65	40	26	17	10	7	4	2

SUBMITTED BY (Signature)

Print Name Dave Fogg Title: Quality Control

Approved.....X Rejected.....

DOT USE ONLY

Bitumen	Mix Temperatures		Materials Data
% Mix	Plant	Street	SpGr of blend agg by
Aim 6.0%	290°	290°	Rice Vacuum = 2.689
Range 5.8-6.4	270°-310°	270°-310°	Sand Equiv. Val = 65
			Degradation Val = 67

Quality Results

	Mat Del.	Absorp.	Sp.Gr.	Year
1.	↔	1.09	2.69	95
2.	↔	↔	↔	↔
3.	↔	1.05	2.70	95
4.	↔	1.01	2.67	95
5.	↔	1.56	2.67	95

Lab Design No. 87

Job Mix No. LAN-AL-2 Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration. Tested 5/15

Stability @ 6.0% = 33 V = 1.2%

Washed = +1.9% minus #200

Hyro @ 6.2% @ 600 rev = 94.39%, HSF @ 300 rev = 0.72, HSI @ 300 rev = 8/8

Date 5/15/95 Signature Art Tilsbury Title Chief of Bit. Design

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

EF# : 600109 Material :MIX DESIGN - C Job Mix :LAN-AL-2
ample Location: LANE - ALTON
etest: 0 Binder: 10

VEEM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
OMPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
ERCENT BINDER.....	5.5	6.0	6.2	6.5	7.0			
ORR. STAB. AT 5000.....	42	33	20	0	0		----	05/15
ULK DENSITY.....	2.389	2.418	2.422	2.408	2.398		.000	
.M.D.....	2.467	2.449	2.441	2.430	2.413		.000	
.M.A.....	16.0	15.5	15.5	16.3	17.1		.0	
ERCENT V.M.A. FILLED...	80	92	95	94	96			
ERCENT OF VOIDS IN MIX.	3.2	1.2	0.8	0.9	0.6		100.0	
ERCENTAGE OF T.M.D.....	96.8	98.8	99.2	99.1	99.4		.0	

BINDER :	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5
T.M.D. :	2.467	2.463	2.460	2.456	2.452	2.449	2.445	2.441	2.438	2.434	2.430

OMMENTS :

ELATED TESTING

MDOT * Degradation	67
T 30 * % Passing #200	
T 11 * % Finer than #200	6.0
T176 * Sand Equivalent	65
T246 * Eff. Sp Gr. Agg	2.689

Reported By: _____

Date Reported: _____

	STATE OF MAINE	Job Mix No.(DOT)	600111
HOT BITUMINOUS	DEPARTMENT OF	Date:	May 3,1995
PAVEMENT JOB MIX	TRANSPORTATION	Contractor:	Lane Const.
		Item No.	425.28
	PLANT DATA	Grading:	"B" (Mix 30% RAP)
1. Make: Bituma	Size: 500 TPH Type: Drum	Location:	Alton
2. Make: Caterpillar	Size: 365 TPH Type: Drum	Location:	Alton

(RAP is binder)

BITUMEN DATA

MATERIAL					Viscosity 275F
Source No.1 Type	AC	Grade: 10	Refiner: Irving Oil	Supplier: Irving	cSt
Source No.2 Type	AC	Grade: 10	Refiner: Chevron	Supplier: Barrett Paving	cSt

AGGREGATE DATA

Size	Pit	Dry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX		Lane - Alton	Alton	Lane Const.
2. Millings			Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX		Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX		Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX		Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

	% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1.	45			100	100	43	8	4	4	3	3	2	2	1.8
2.	38			100	100	87	78	55	43	35	26	18	12	8.4
3.	8			100	100	100	72	8	5	5	4	3	3	1.7
4.	5			100	100	100	100	94	64	44	30	19	11	7.9
5.	20			100	100	100	98	74	57	40	23	12	7	4.5
Resultant				100	100	78	52	38	29	22	15	10	6	4.6

JOB MIX

Aim	100	100	78	52	38	29	22	15	10	7	5
Range	100	100	77		45	35	27		14	10	7
	100	96	63		31	23	17		6	4	3
Specification Limits	100	100	85	0	60	50	39	0	24	16	8
	100	90	50	0	28	20	14	0	6	4	1

SUBMITTED BY _____ (Signature)

Print Name Dave Fogg Title: Quality Control

Approved.....X Rejected.....

DOT USE ONLY

	Bitumen	Mix Temperatures		Materials Data
	% Mix	Plant	Street	SpGr of blend agg by
Aim	3.8 new	290°	290°	Rice Vacuum = 2.678
Range	3.6-4.2	270°-310°	270°-310°	Sand Equiv. Val = 70
				Degradation Val = 63

Quality Results

	Mat Del.	Absorp.	Sp.Gr.	Year
1.	″	1.09	2.69	95
2.	″	″	″	″
3.	″	″	″	″
4.	″	1.01	2.67	95
5.	″	1.56	2.63	95

Lab Design No. 89

Job Mix No. LAN-AL-4 Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration. Tested 5/17/95

Stability @ 5.4% total = 47 V = 2.2%

Hyeo @ 5.3% total @ 60 sec = 92.44%, MSF @ 300 sec = 1.11, MSI @ 300 sec = 8/8

Asphalt: 3.8% new
1.6% RAP
5.4% total

Date 5/18/95 Signature Art Tillsbury Title Chief of Bit. Design

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

REF# : 600111 Material :MIX DESIGN - HR Job Mix :LAN-AL-4
Sample Location: LANE - ALTON
Retest: 1 Binder: 10

HVEEM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
COMPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
PERCENT BINDER.....	4.6	5.1	5.3	5.6	6.1			
CORR. STAB. AT 5000.....	46	48	46	38	37		----	05/17
BULK DENSITY.....	2.382	2.385	2.416	2.394	2.369		.000	
T.M.D.....	2.492	2.473	2.466	2.455	2.436		.000	
V.M.A.....	15.1	15.5	14.6	15.6	16.9		.0	
PERCENT V.M.A. FILLED...	71	77	86	84	84			
PERCENT OF VOIDS IN MIX.	4.4	3.6	2.0	2.5	2.8		100.0	
PERCENTAGE OF T.M.D.....	95.6	96.4	98.0	97.5	97.2		.0	

BINDER :	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5
T.M.D. :	2.495	2.492	2.488	2.484	2.480	2.477	2.473	2.469	2.466	2.462	2.458

COMMENTS : (RAP A/C=5.32)*.30=1.59%

RELATED TESTING

MDOT * Degradation	63
T 30 * % Passing #200	
T 11 * % Finer than #200	4.1
T176 * Sand Equivalent	70
T246 * Eff. Sp Gr. Agg	2.678

Reported By: _____

Date Reported: _____

HOT BITUMINOUS PAVEMENT JOB MIX	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	
		Job Mix No.(DOT) *600110*
		Date: *MAY 3*,1995
		Contractor: Lane Const.
		Item No. 301.09 & 403.07
		Grading: "B" (Mix 20% RAP)

PLANT DATA

	Make	Size	Type	Location
1.	Bituma	500 TPH	Drum	Alton
2.	Caterpillar	365 TPH	Drum	Alton

BITUMEN DATA

MATERIAL	Type	Grade	Refiner	Supplier	Viscosity 275F
Source No.1	AC	*10*	Irving Oil	Irving	cSt
Source No.2	AC	*10*	Chevron	Barrett Paving	cSt

AGGREGATE DATA

Size	Pit	Qry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX		Lane - Alton	Alton	Lane Const.
2. Millings			Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX		Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX		Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX		Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1. 45			100	100	43	8	4	4	3	3	2	2	1.8
2. 20			100	100	87	70	55	43	35	26	18	12	8.4
3. 5			100	100	100	72	8	5	5	4	3	3	1.7
4. 0			100	100	100	100	94	64	44	30	19	11	7.9
5. 30			100	100	100	98	74	57	40	23	12	7	4.5
Resultant			100	100	72	52	35	28	21	14	8	6	3.9

JOB MIX

	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
Aim			100	100	72	52	35	28	21	14	9	7	4
Range			100	100	79		42	34	26		13	10	6
			100	90	65		28	22	16		6	4	2
Specification			100	100	85		60	38	39		24	16	8
Limits			100	80	58		28	20	14		6	4	1 *ok*

SUBMITTED BY *[signature]* (Signature)

Print Name Dave Fogg Title: Quality Control

Approved...... *X* Rejected......| | DOT USE ONLY

Bitumen	% Mix	Mix Temperatures Plant	Street	Materials Data	Mat	Del.	Absorp.	Sp.Gr.	Year
				SpGr of blend agg by	1.	〃	*1.09*	*2.69*	*95*
					2.	〃	〃	〃	〃
Aim	*4.4 new*	*290°*	*290°*	Rice Vacuum = *2.682*	3.	〃	*1.05*	*2.70*	*95*
Range	*4.2-4.8*	*270°-310°*	*270°-310°*	Sand Equiv. Val = *69*	4.	〃	〃	〃	〃
				Degradation Val = *68*	5.	〃	*1.56*	*2.63*	*95*

Lab Design No. *88*

Job Mix No. *LAN-AL-3* Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration. *tested 5/17/95*

stability @ 5.4% total = 36 V = 2.5%

Gyro @ 5.3% total AC @ 60 revs = 91.71%, MSF @ 300 revs = 0.88, MST @ 300 revs = 8/8

Asphalt 4.4% new
1.0% RAP
5.4% total

Date *5/18/95* Signature *Art Pillsbury* Title *Chief of Bit Design*

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

I F# : 600110 Material :MIX DESIGN - RB Job Mix :LAN-AL-3
Sample Location: LANE - ALTON
Retest: 1 Binder: 10

HVEEM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
COMPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
PERCENT BINDER.....	4.6	5.1	5.3	5.6	6.1			
CORR. STAB. AT 5000.....	35	41	34	40	22		----	05/17
BULK DENSITY.....	2.394	2.396	2.413	2.387	2.409		.000	
T.M.D.....	2.495	2.476	2.469	2.458	2.440		.000	
V.M.A.....	14.8	15.2	14.8	16.0	15.7		.0	
PERCENT V.M.A. FILLED...	73	79	85	82	92			
PERCENT OF VOIDS IN MIX.	4.0	3.2	2.3	2.9	1.3		100.0	
PERCENTAGE OF T.M.D.....	96.0	96.8	97.7	97.1	98.7		.0	

BINDER :	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5
T.M.D. :	2.499	2.495	2.491	2.487	2.484	2.480	2.476	2.473	2.469	2.465	2.461

COMMENTS : (RAP A/C=5.32)*.20=1.06%

RELATED TESTING

MDOT * Degradation	68
T 30 * % Passing #200	
T 11 * % Finer than #200	4.8
T176 * Sand Equivalent	69
T246 * Eff. Sp Gr. Agg	2.682

Reported By: _____

Date Reported: _____

	STATE OF MAINE	Job Mix No.(DOT) 600112
HOT BITUMINOUS	DEPARTMENT OF	Date: May 3, 1995
PAVEMENT JOB MIX	TRANSPORTATION	Contractor: Lane Const.
		Item No. 403.08
PLANT DATA		Gradings: "C" (Mix 20% RAP)
1. Make: Bituma	Size: 500 TPH Type: Drum	Location: Alton
2. Make: Caterpillar	Size: 365 TPH Type: Drum	Location: Alton

Shldr. + adj. lane wearing surface

BITUMEN DATA

	MATERIAL		Viscosity 275F
Source No.1 Type AC Grade: 10	Refiner: Irving Oil	Supplier: Irving	cSt
Source No.2 Type AC Grade: 10	Refiner: Chevron	Supplier: Barrett Paving	cSt

AGGREGATE DATA

Size	Pit	Qry	Original Source & Owner	Current Location of Material	Present Owner
1. 3/4" Stone	XX		Lane - Alton	Alton	Lane Const.
2. Millings			Various Locations	Alton	Lane Const.
3. 3/8" Stone	XX		Lane - Alton	Alton	Lane Const.
4. Cr. Sand	XX		Lane - Alton	Alton	Lane Const.
5. Natural Sand	XX		Lane - Alton	Alton	Lane Const.

Stockpile gradations ---- Percentages passing sieve sizes

% Used	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16	No.30	No.50	No.100	No.200
1. 18			100	100	43	8	4	4	3	3	2	2	1.8
2. 28			100	100	87	78	55	43	35	26	18	12	8.4
3. 28			100	100	100	72	8	5	5	4	3	3	1.7
4. 5			100	100	100	100	94	64	44	30	19	11	7.9
5. 45			100	100	100	98	74	57	40	23	12	7	4.5
Resultant			100	100	92	79	48	36	27	17	10	7	4.9

JOB MIX

Aia			100	100	92	79	48	36	27	17	11	7	5
Range			100	100	99	86	55	42	32	21	15	10	7
			100	100	85	72	41	30	22	13	7	4	3
Specification			100	100	100	100	70	52	40	30	22	14	7
Limits			100	100	88	65	40	26	17	10	7	4	2

SUBMITTED BY (Signature)

Print Name Dave Fogg Title: Quality Control

Approved.....X Rejected.....

DOT USE ONLY

	Bitumen	Mix Temperatures		Materials Data
	% Mix	Plant	Street	SpGr of blend agg by
Aia	5.1% new	290°	290°	Rice Vacuum = 2.684
Range	4.9-5.5	270°-310°	270°-310°	Sand Equiv. Val = 71
				Degradation Val = 68

Quality Results

	Mat	Opl.	Absorp.	Sp.Gr.	Year
1.	cs		1.09	2.69	95
2.	cs		cs	cs	cs
3.	cs		1.05	2.70	95
4.	cs		1.01	2.67	95
5.	cs		1.56	2.63	95

Lab Design No. 90

Job Mix No. LAN-AL-5 Unless otherwise noted, the following statement applies to this Job-Mix:

Comments This job-mix approved for use on all applicable MDOT projects pending a passing trial batch, passing fractured and elongation tests, and asphalt nuclear guage calibration. Tested 5/18/95

Stability @ 6.1% total = 38 V = 2.8%

Hypo @ 6.3% total @ 60 revs = 93.32, MSE @ 300 revs = 0.70, MST @ 300 revs = 8/9

Asphalt: 5.1% new
1.0% RAP
6.1% total.

Date 5/19/95 Signature Art Eatburn Title Chief of Bit Design

MAINE DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
Central Lab * Bangor, ME

BITUMINOUS DESIGN REPORT

F# : 600112 Material :MIX DESIGN - C Job Mix :LAN-AL-5
mple Location: LANE - ALTON
test: 1 Binder: 10

EM TEST RESULTS	1	2	3	4	5	6	DOT	TESTED
MPACTION METHOD.....	STD	STD	STD	STD	STD	STD	MOD	
RCENT BINDER.....	5.6	6.1	6.3	6.6	7.1			
RR. STAB. AT 5000.....	32	38	24	19	0		----	05/18
LK DENSITY.....	2.414	2.372	2.406	2.388	2.411		.000	
M.D.....	2.459	2.441	2.434	2.423	2.405		.000	
M.A.....	15.1	17.0	16.0	16.9	16.5		.0	
RCENT V.M.A. FILLED...	88	83	93	91	101			
RCENT OF VOIDS IN MIX.	1.8	2.8	1.1	1.4	-0.2		100.0	
RCENTAGE OF T.M.D.....	98.2	97.2	98.9	98.6	100.2		.0	

BINDER :	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5
T.M.D. :	2.463	2.459	2.456	2.452	2.448	2.445	2.441	2.437	2.434	2.430	2.427

MMENTS : (RAP A/C=5.32)*.20=1.06%

LATED TESTING

MDOT * Degradation	68
T 30 * % Passing #200	
T 11 * % Finer than #200	5.4
T176 * Sand Equivalent	71
T246 * Eff. Sp Gr. Agg	2.684

Reported By: _____

Date Reported: _____

Figure B-1. Nuclear Density/Moisture Measurements at Test Pit Location TP1 of Section 230506, Before Construction

Figure B-2. Coring at Location C18 of Section 230506, Before Construction

Figure B-3. Split Spoon Sampling of the Subgrade Layer at Location A2 of Section 230506, Before Construction

Figure B-4. Augering at Location BA3 of Section 230502 for Collecting Subgrade, Subbase, and Base Bulk Samples for Laboratory Testing, Before Construction (127 mm x 178 mm Stone Showing)

Figure B-5. Shoulder Auger Probe at Location S1 at Station 2+50 of Section 230503, Before Construction

Figure B-6. SHRP Identification Sign at the Beginning of Section 230503 Station 0+00, Before Construction

Figure B-7. Pavement Markings on Section 230507 Showing Bleeding, Before Construction

Figure B-8. Edge of Pavement and Centerline Cracks and Bleeding in the Wheel Paths of Section 230504 at Station 2+40, Before Construction

Figure B-9. Centerline Longitudinal High Severity Crack in Section 230506 at Station 1+40, Before Construction

Figure B-10. High Severity Transverse Crack in Section 230504 at Station 1+85, Before Construction

Figure B-11. The After Section Sampling Locations of Section 230506, Stations 5+05, 5+10, 5+15, and 5+20, Before Construction (Bleeding Mainly in Left Wheel Path)

Figure B-12. Milling Machine on Section 230507 at Station 5+00, Next to Centerline Pass

Figure B-13. Milled Sections Starting from Station 0-81 of Section 230506

Figure B-14. Paver on Section 230504 Station 5+00, Tack Coat on Old Surface

Figure B-15. Paving and Rolling the Milled Surface of Section 230509, Collecting Fresh Loose Bulk Sample BR3 from the Paver Hopper While at Station 2+50

Figure B-16. Six Buckets of Fresh Loose Bulk Sample BV4 Collected from the Paver Hopper While at Station 2+50 of Section 230504, 3 for MDOT and 3 for MRL

Figure B-17. MDOT Staff Measuring Nuclear Density of the Fresh Surface Mix in Section 230502 Station 0+00

Figure B-18. Lane Portable Model 500 Recycle Drum Mix Asphalt Plant in Alton, Maine

Figure B-19. Lane Portable Model 500 Recycle Drum Mix Asphalt Plant in Alton, Maine

Figure B-20. SHRP Sign and New Pavement at Section 230502, Showing Two Cores Taken From Station 0-45 of Section 230502

Figure B-21. Markings on the New Overlay Surface of Section 230502, Showing the FWD and the Transverse Dipstick Survey

Figure B-22. Collecting 102 mm Diameter Core at Location C82, Station 5+45 of Section 230503, After Construction

Figure B-23. Nuclear Density Measurements in Section 230507, Station 2+50, and Measuring the Lane Width and the Location of the Wheel Paths, After Construction